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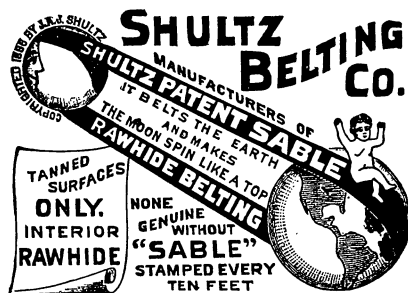
A Review of the Hardware, Iron and Machinery

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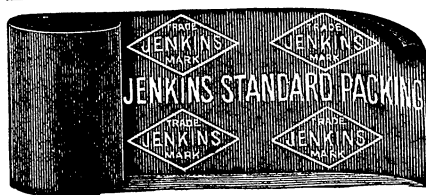
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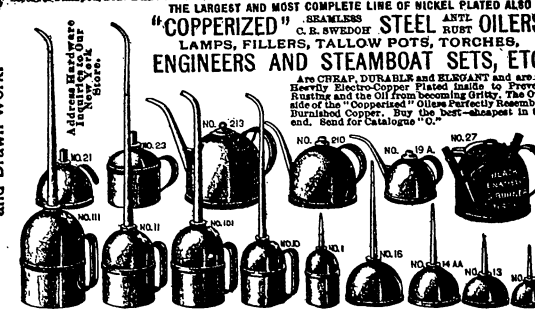


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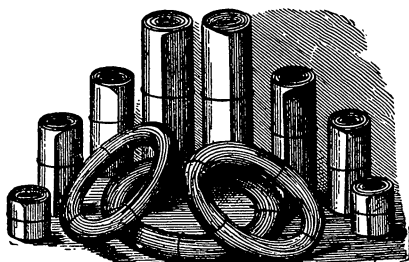
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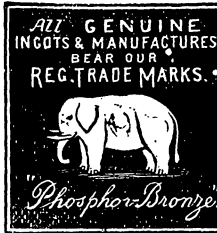
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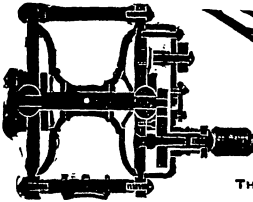
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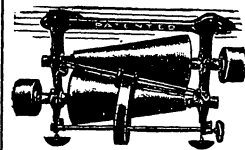
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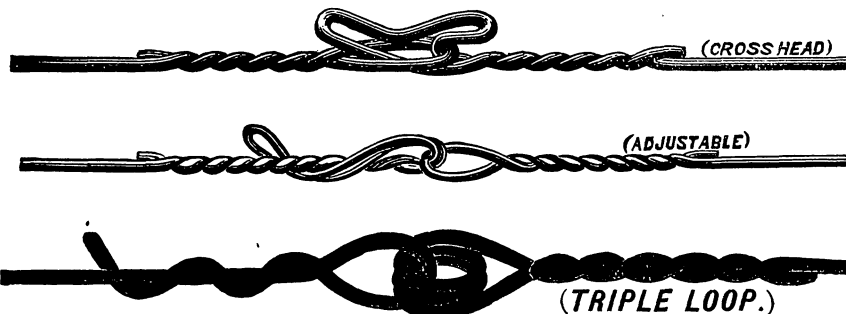
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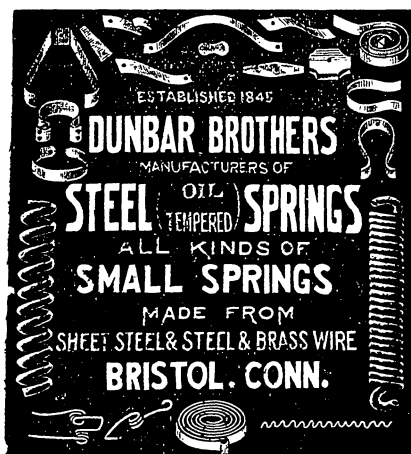


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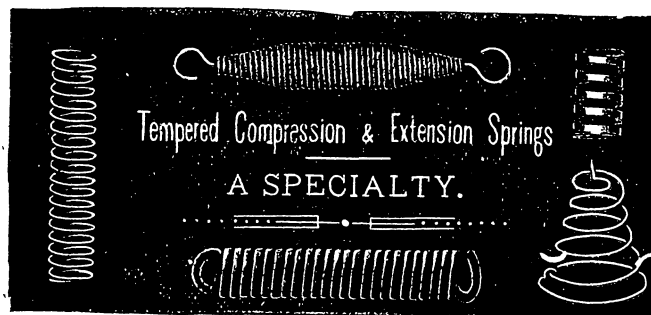


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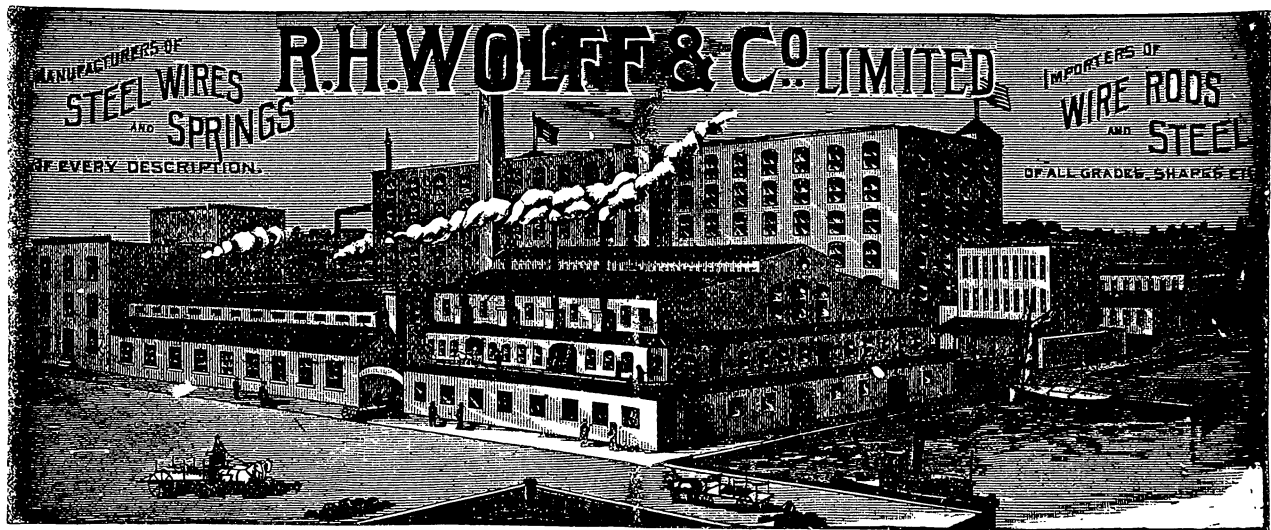


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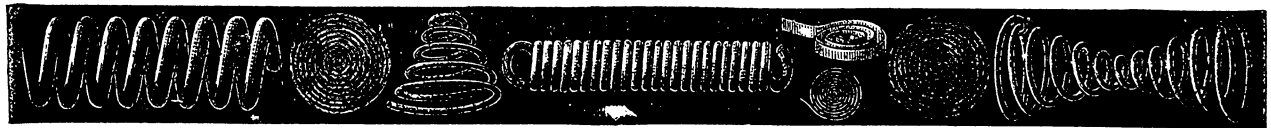
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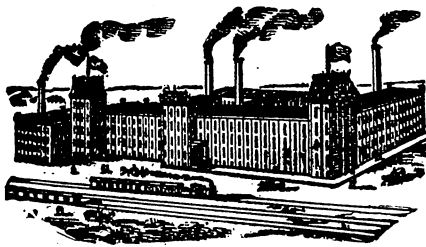
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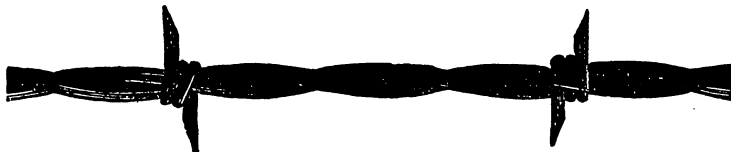
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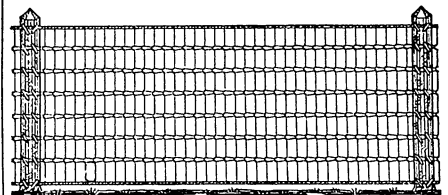
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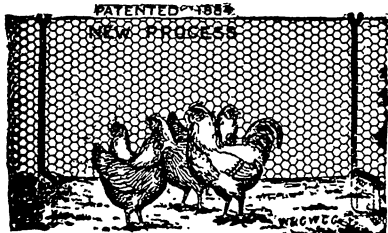
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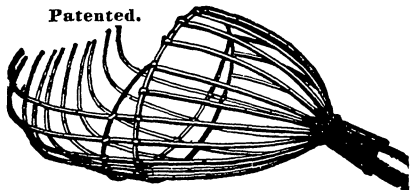
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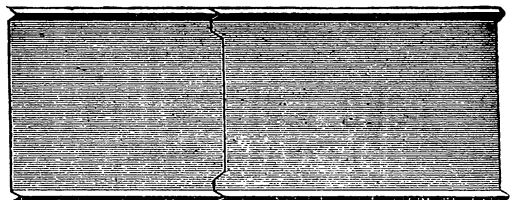
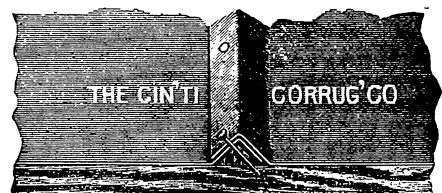
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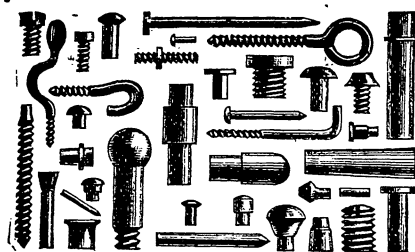
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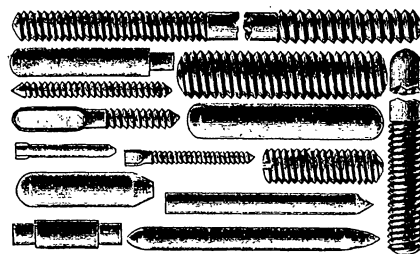
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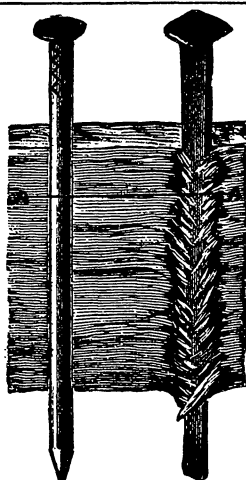


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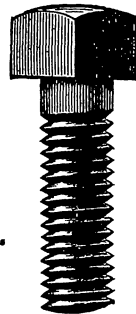
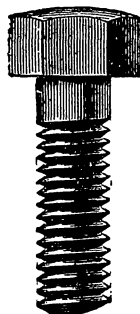
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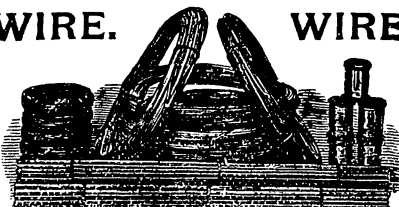
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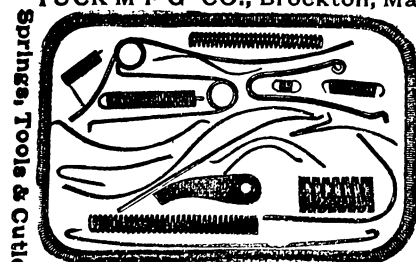
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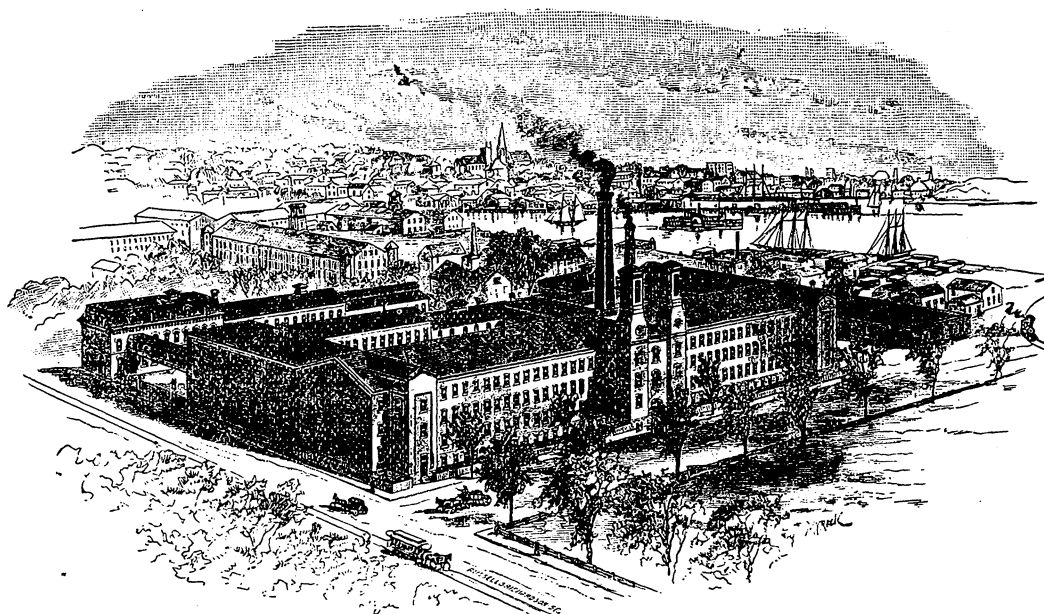
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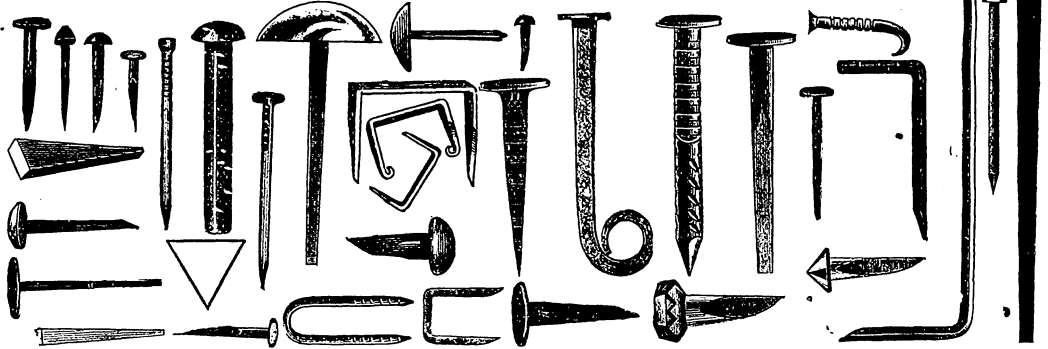
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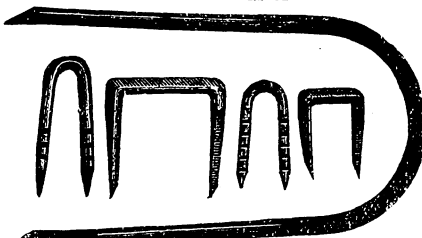
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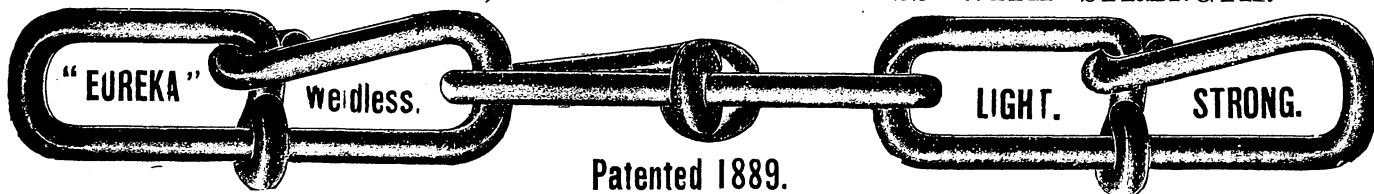
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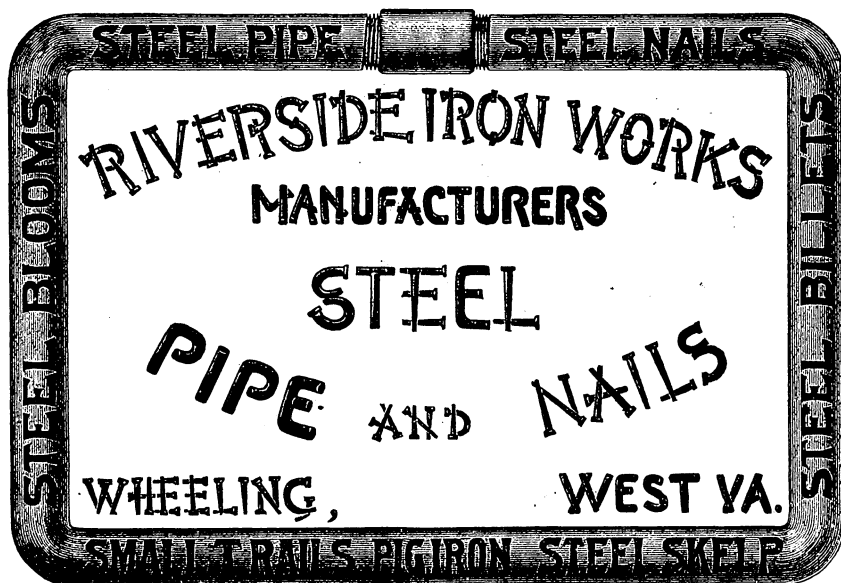
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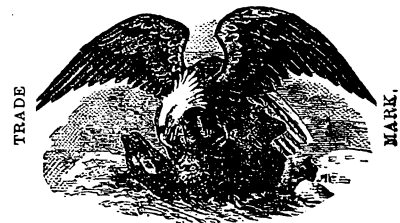
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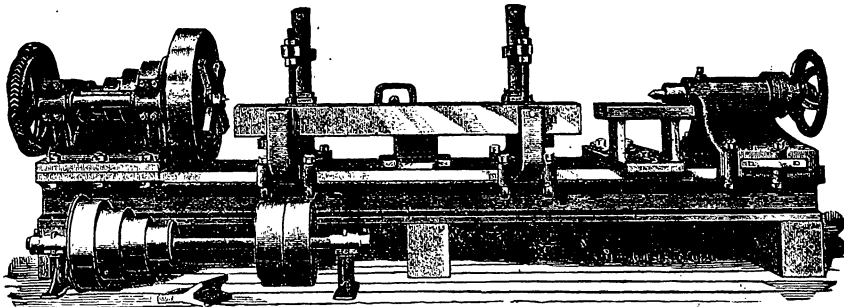
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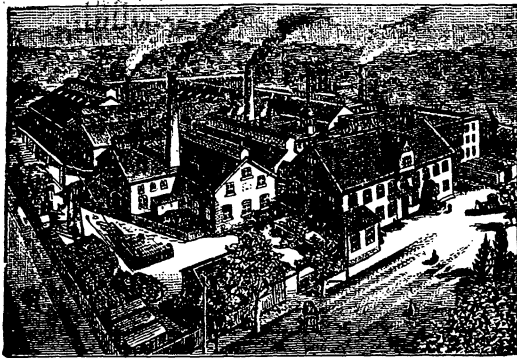
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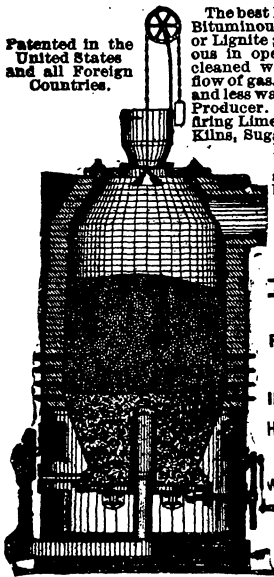
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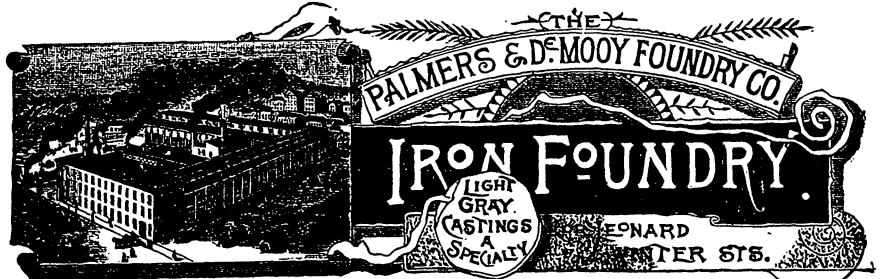
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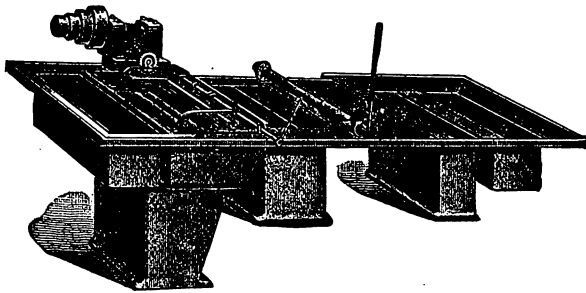
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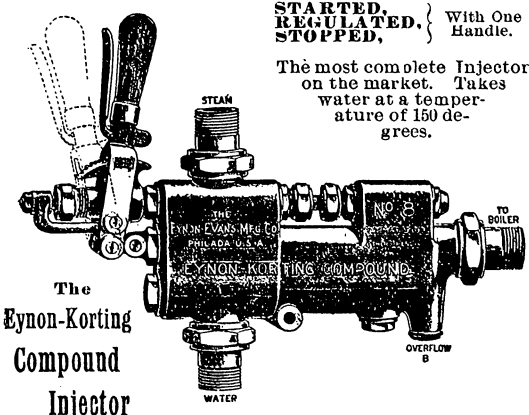
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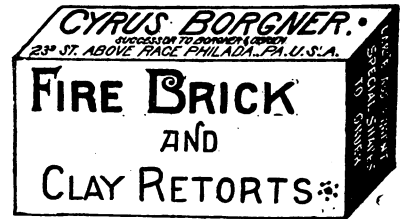
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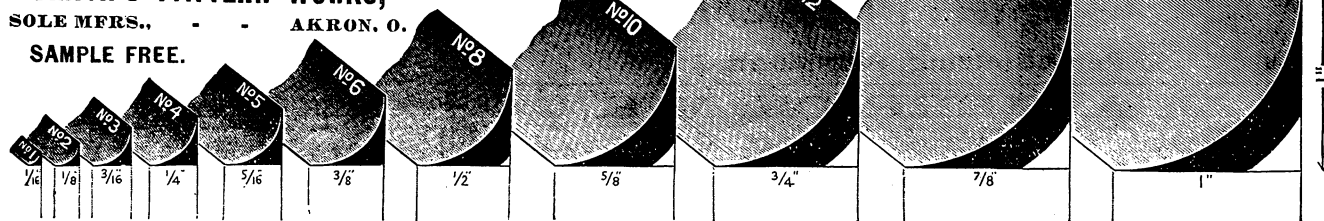
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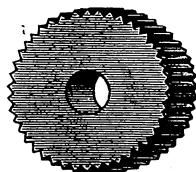
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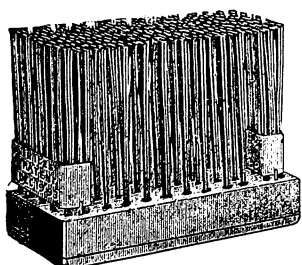
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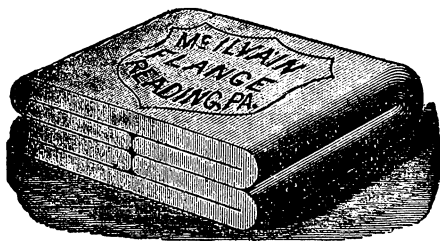
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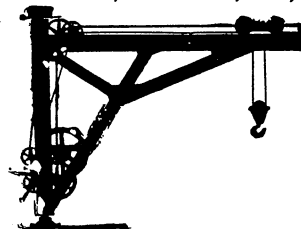
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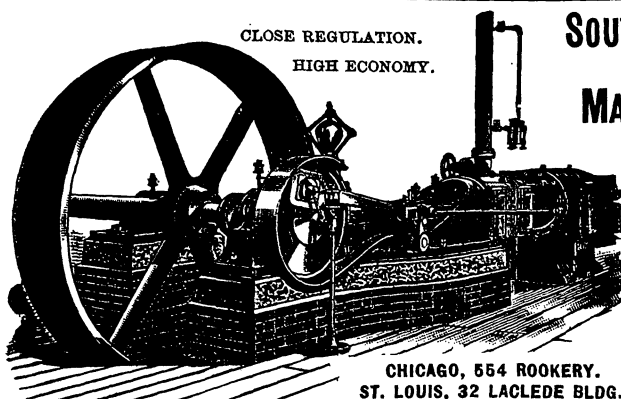
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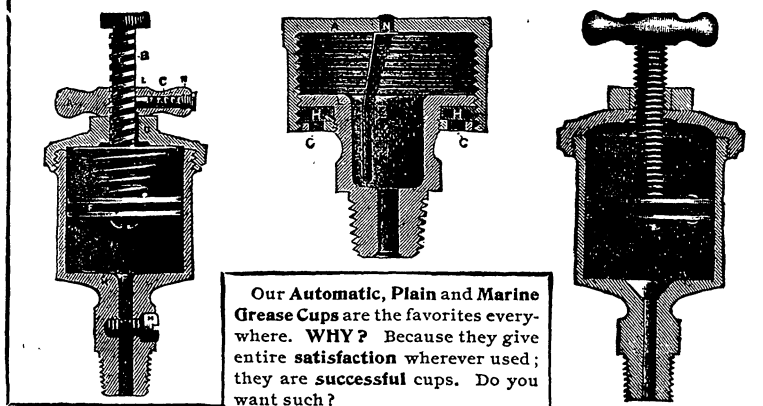
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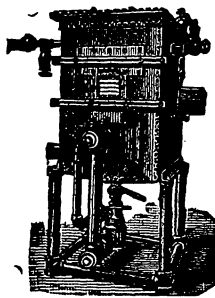
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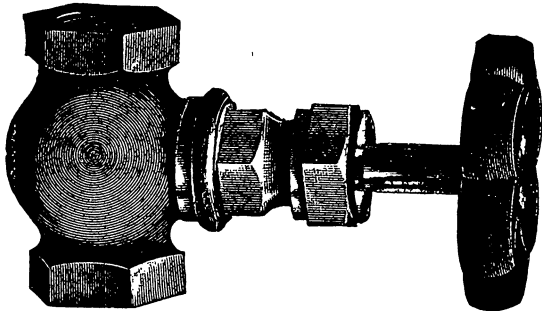
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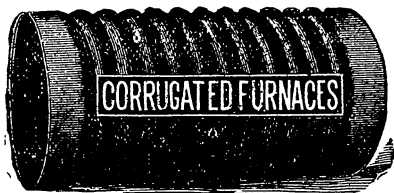
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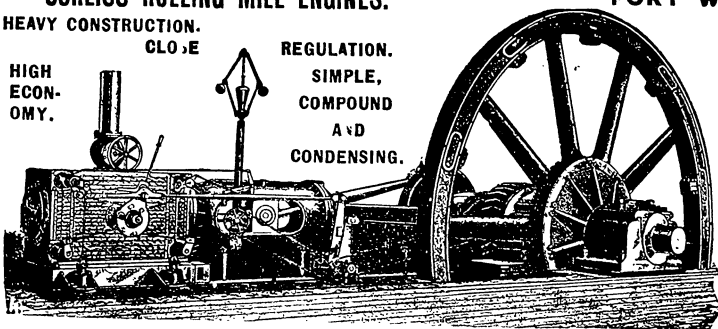
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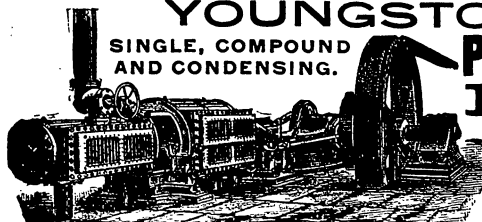
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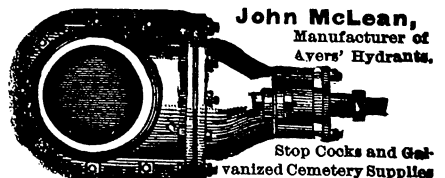
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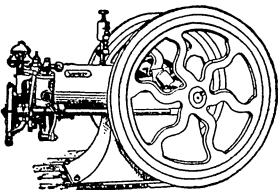


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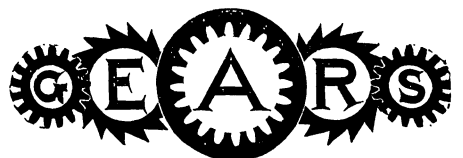
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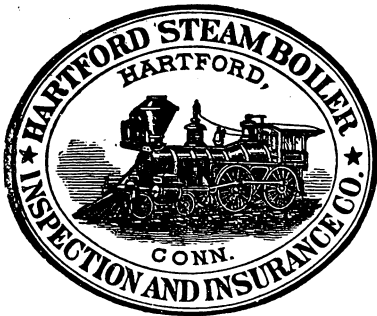
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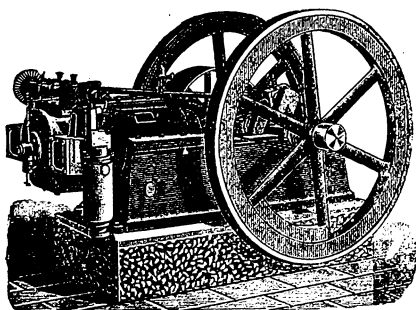
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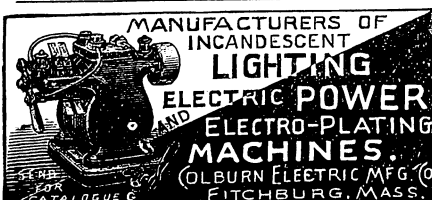
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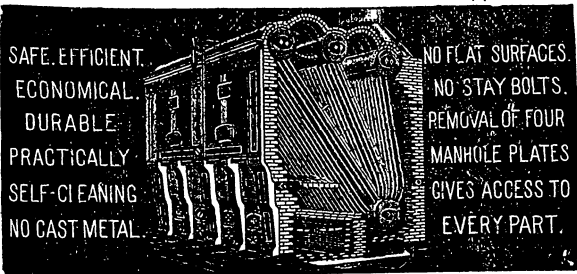
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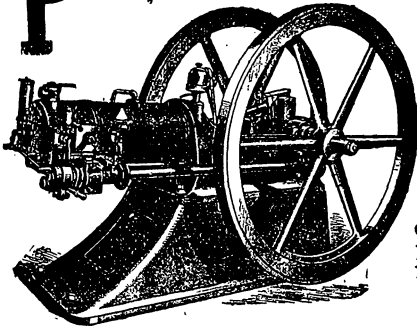


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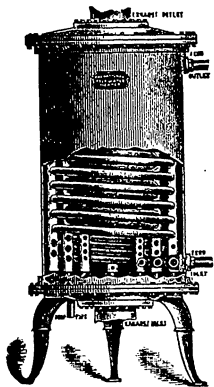
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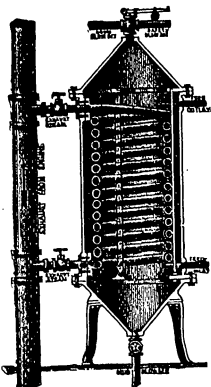
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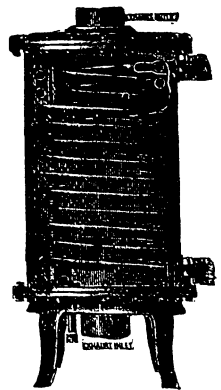
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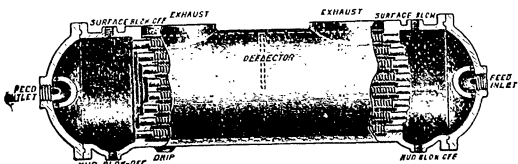
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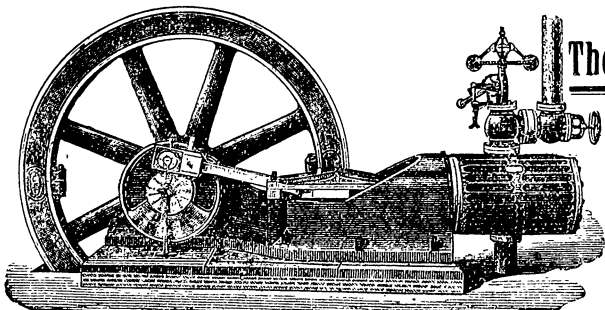
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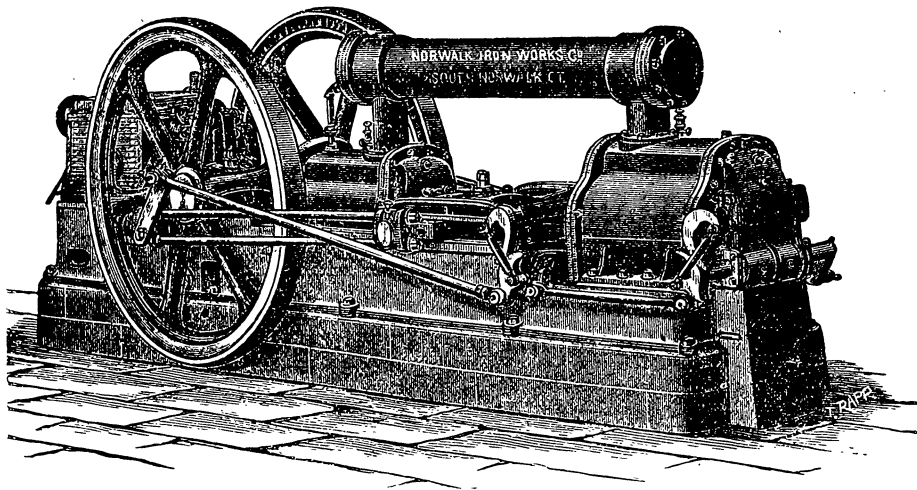
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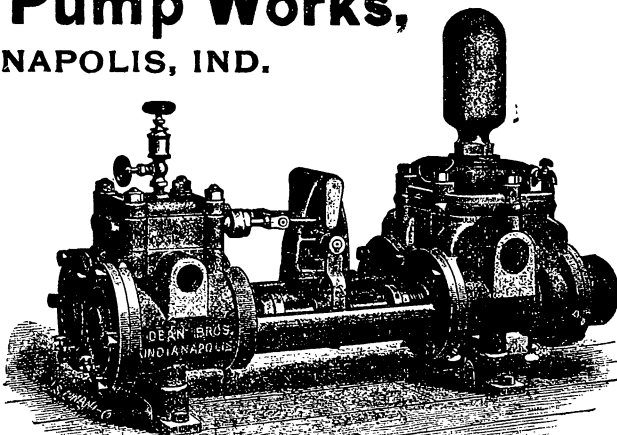
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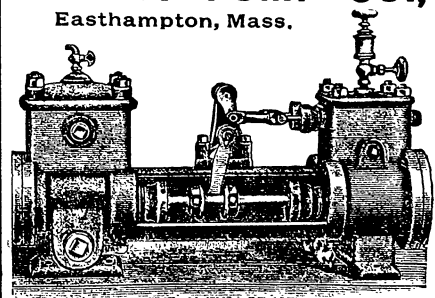
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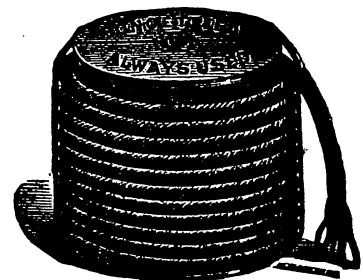
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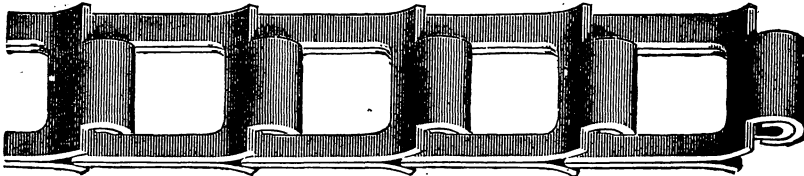
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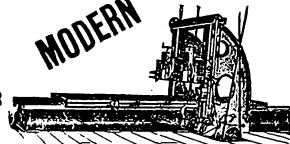
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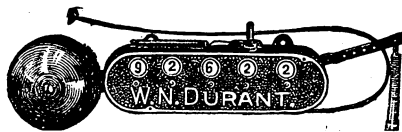
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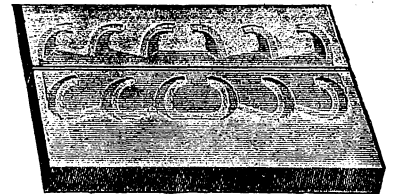
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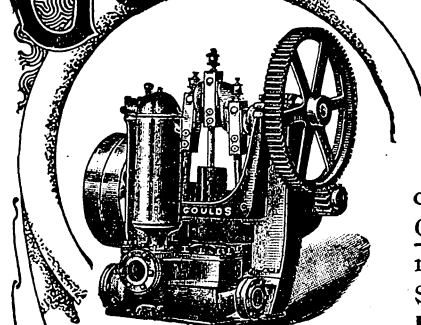
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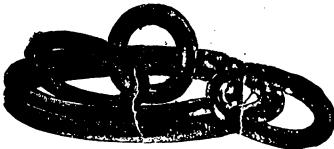
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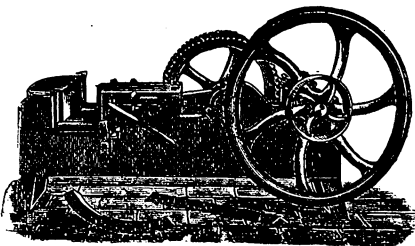
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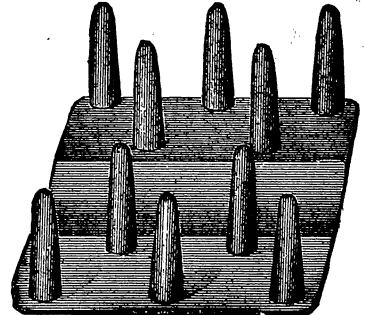
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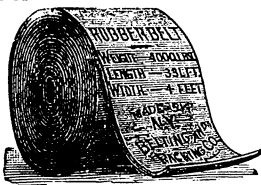
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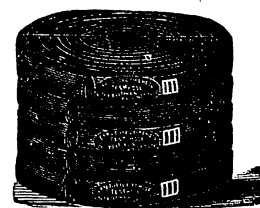


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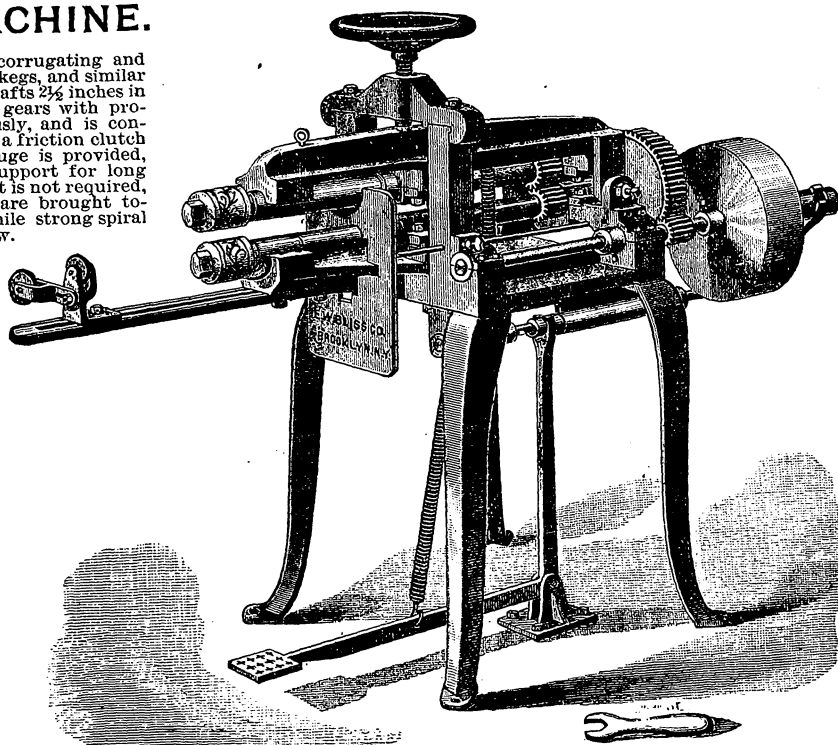
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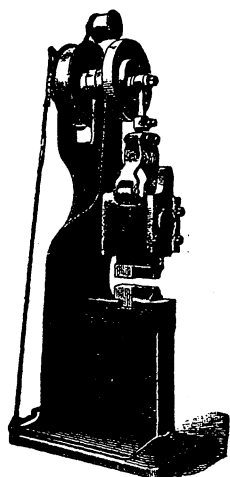
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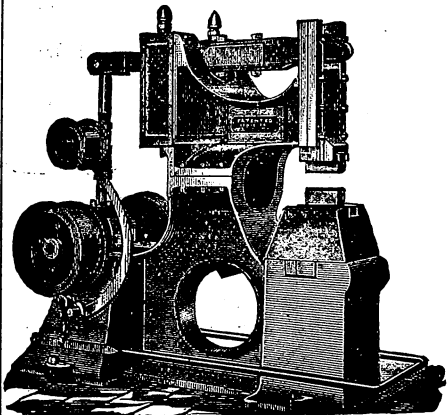
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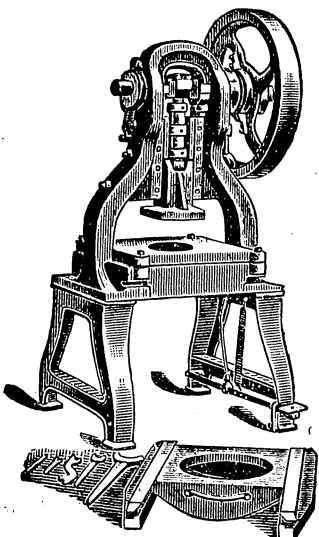
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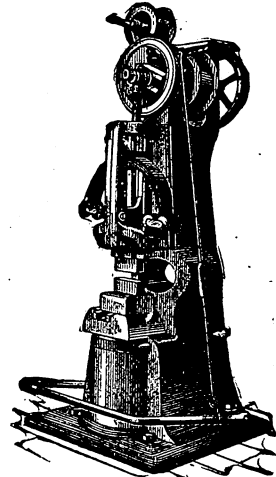
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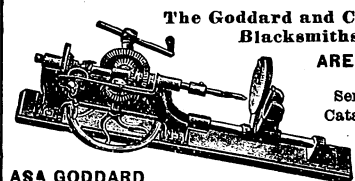
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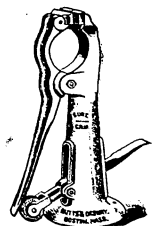
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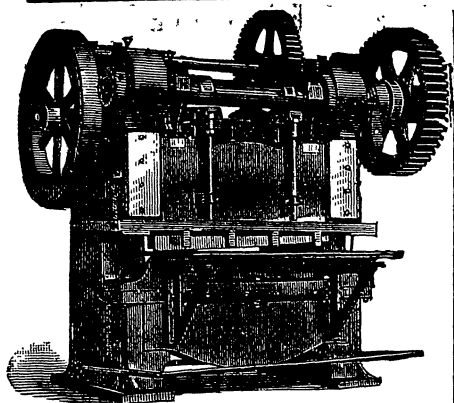
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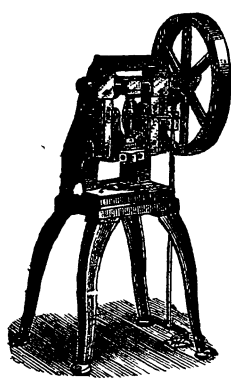


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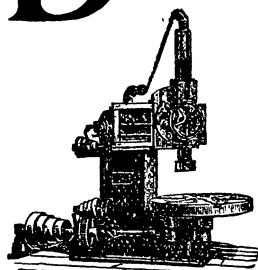
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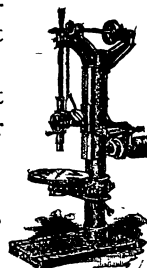
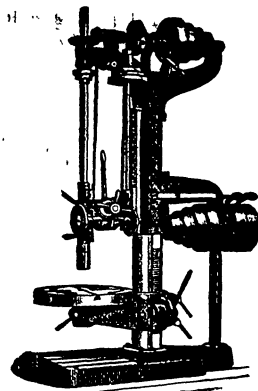
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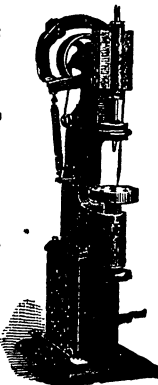
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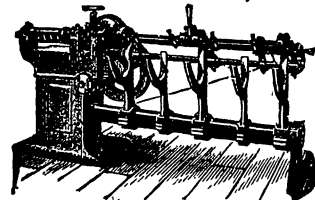
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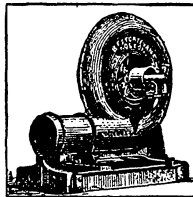
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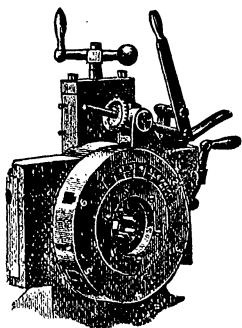
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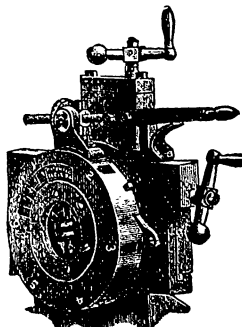
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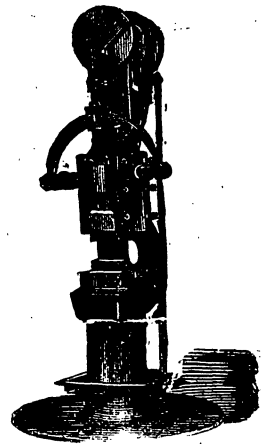
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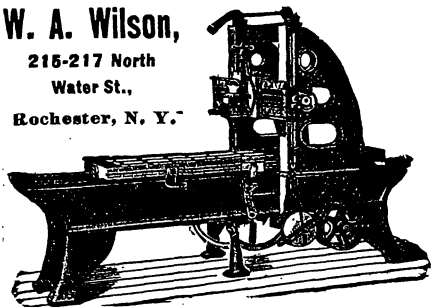
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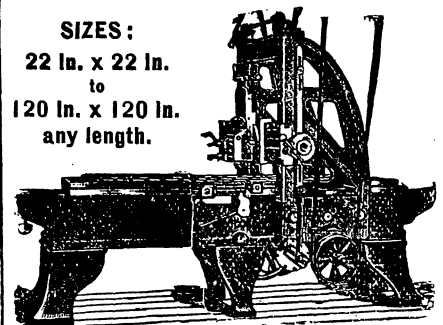
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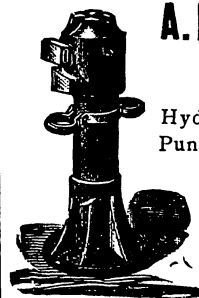
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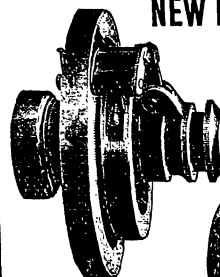


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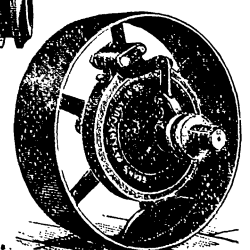
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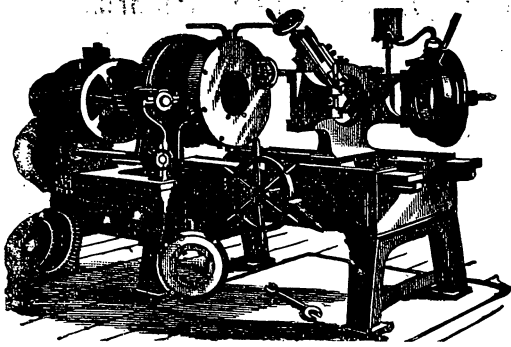
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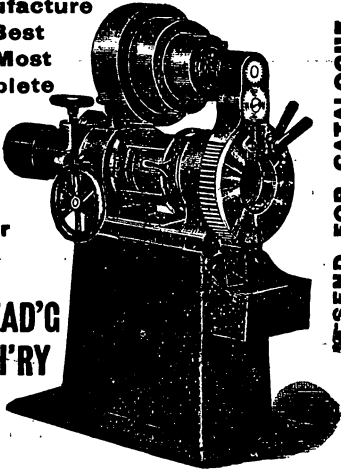
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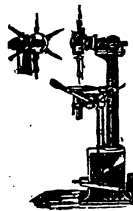
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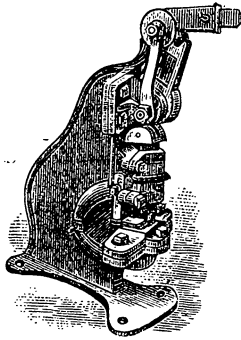
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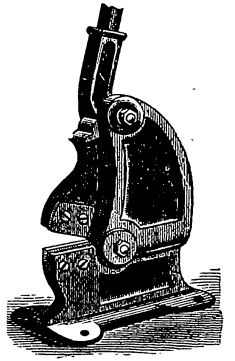


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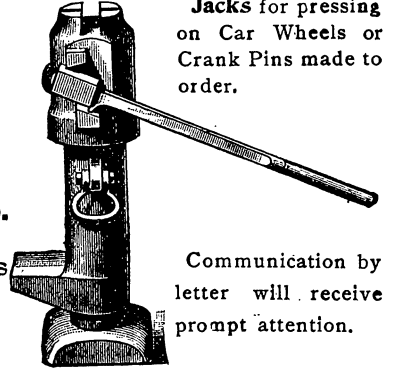
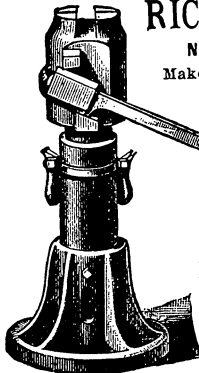
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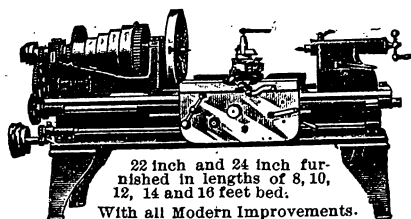
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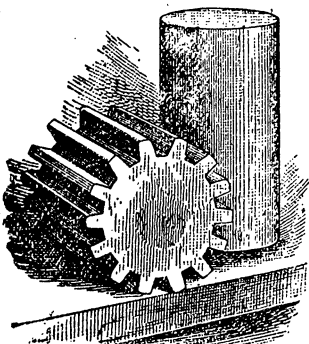
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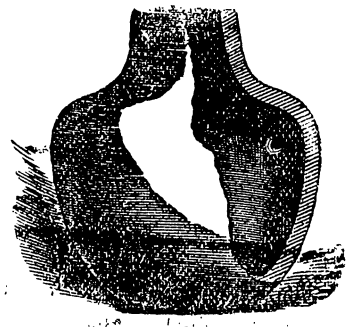
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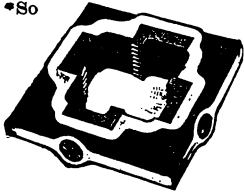
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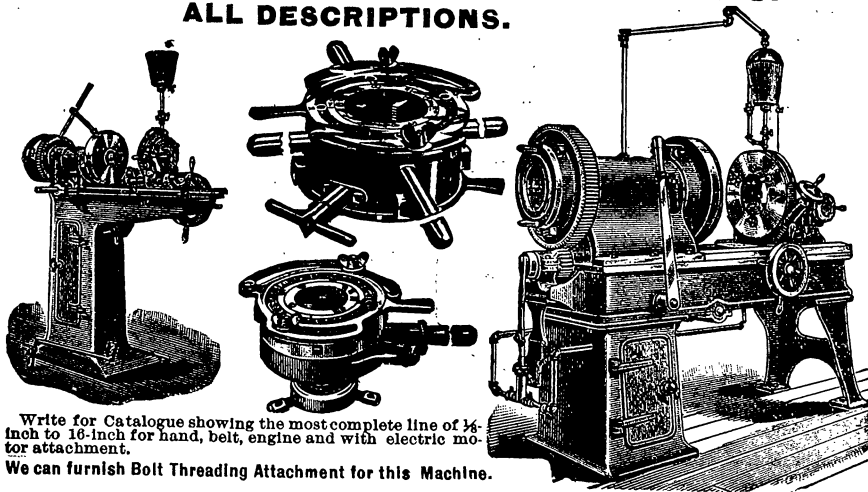
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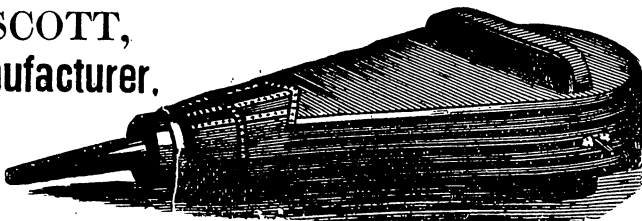
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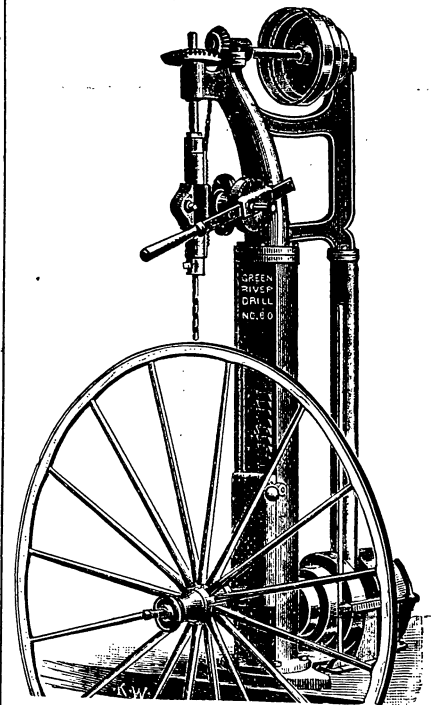
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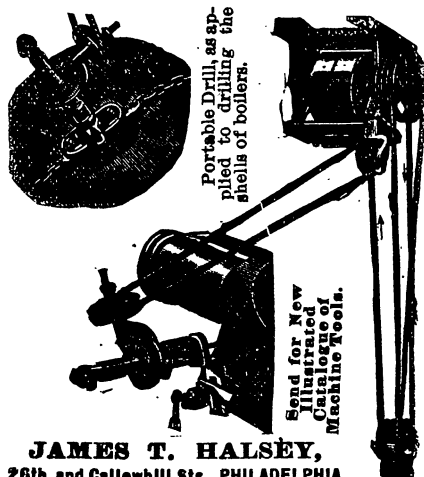
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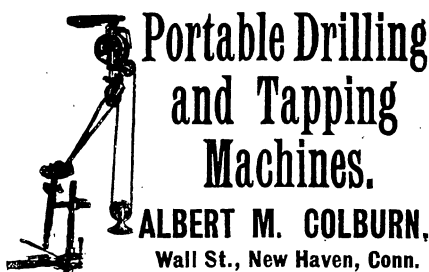
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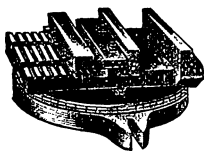
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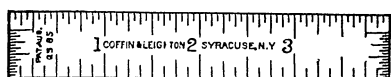
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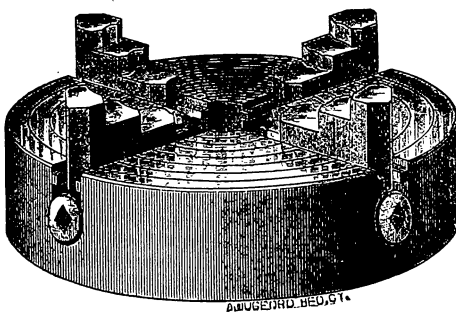
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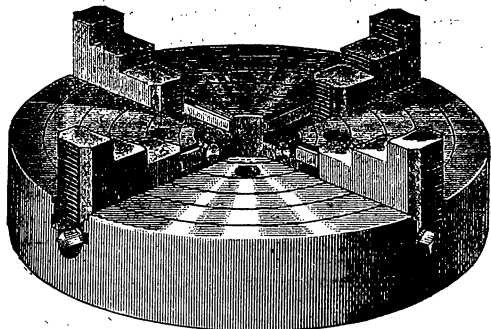
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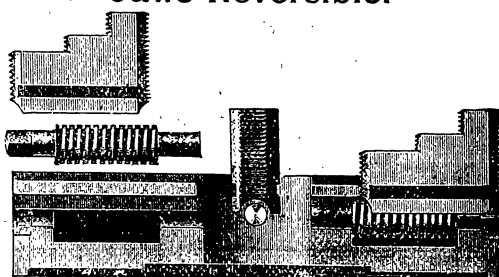
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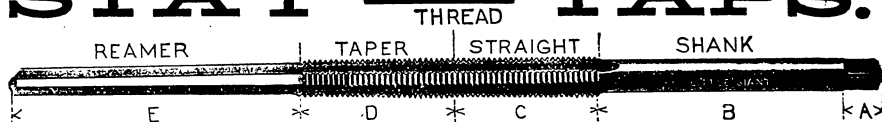
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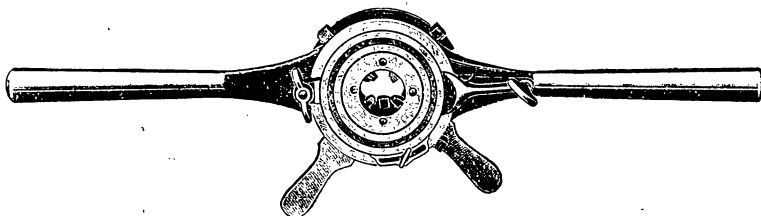


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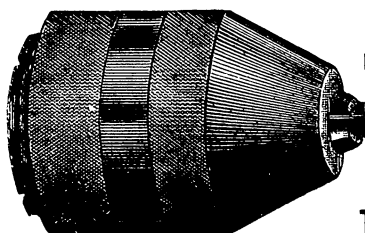
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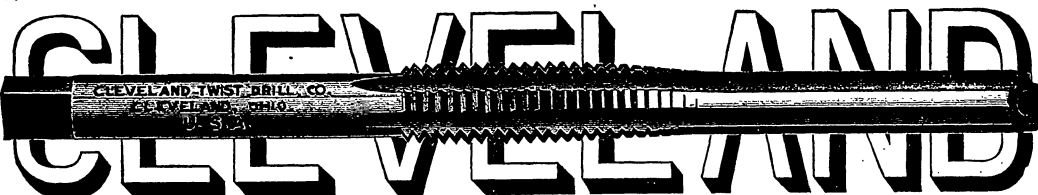
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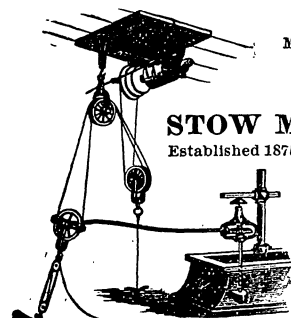
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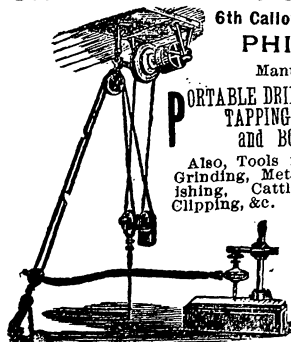
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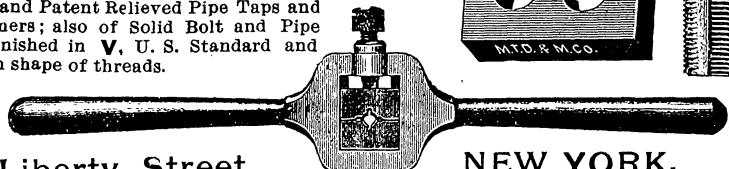
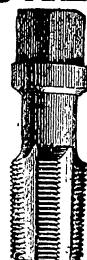
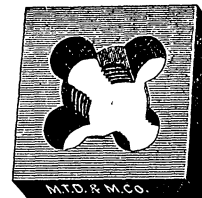


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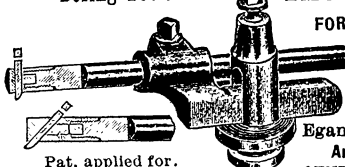
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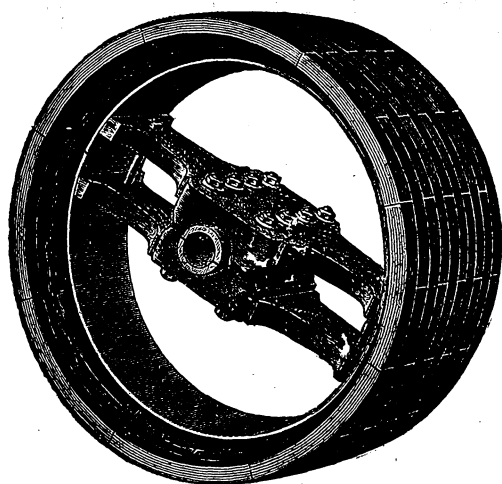
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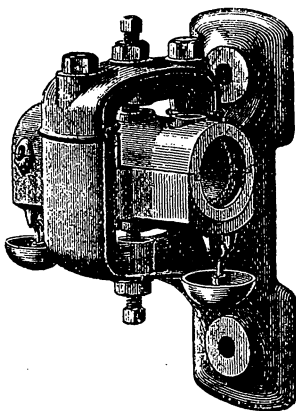
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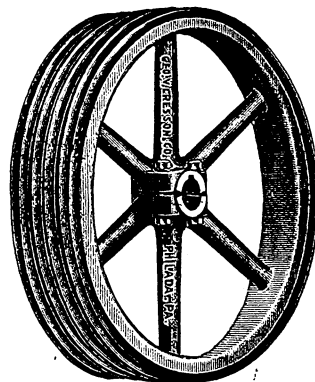
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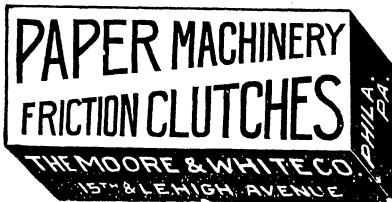
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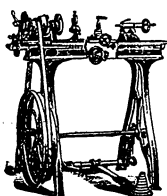
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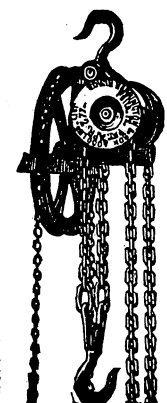
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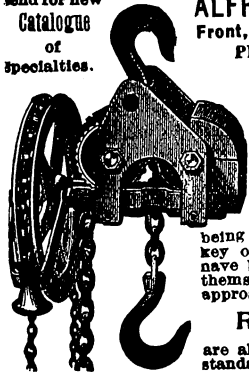
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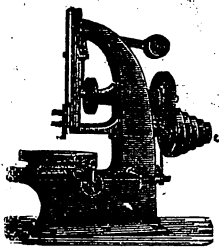
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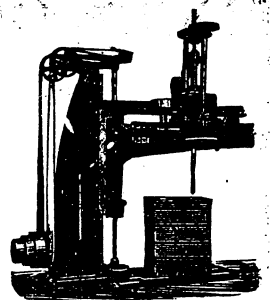
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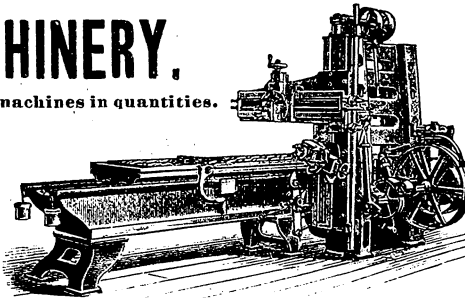
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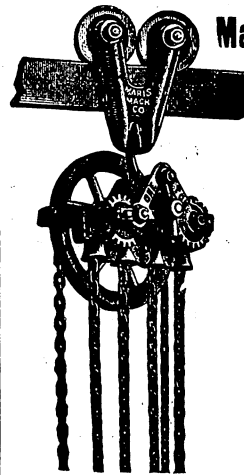
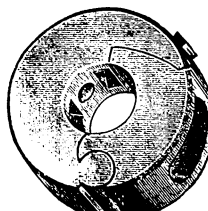
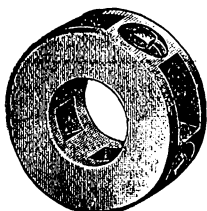
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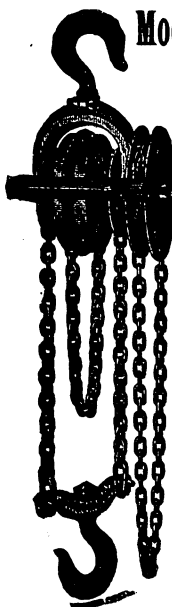
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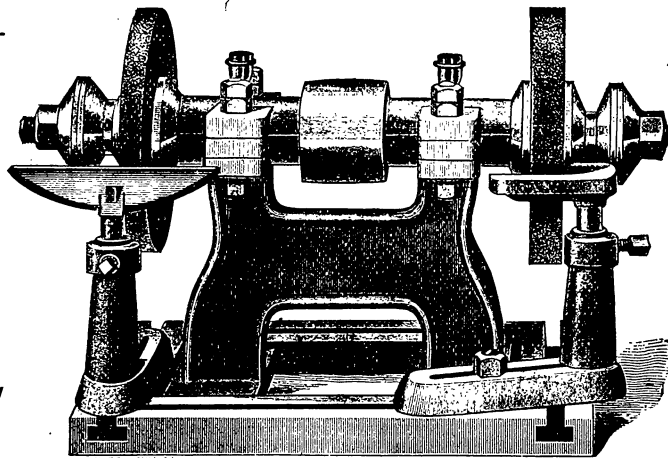
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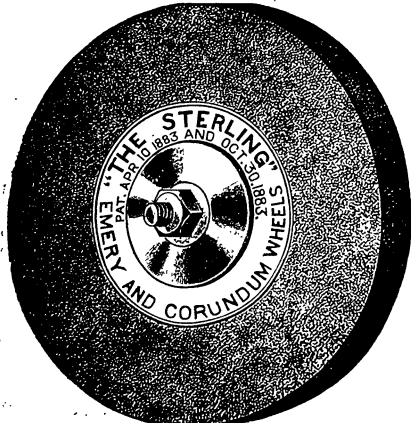
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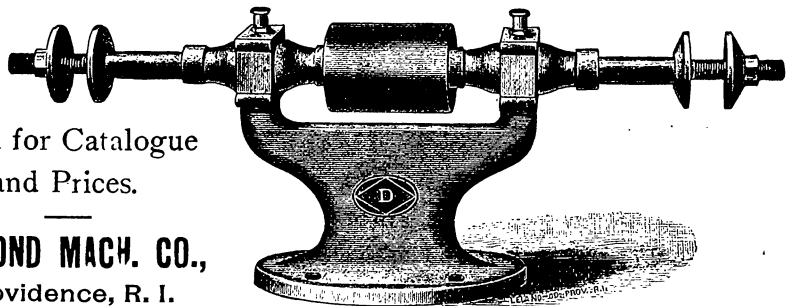
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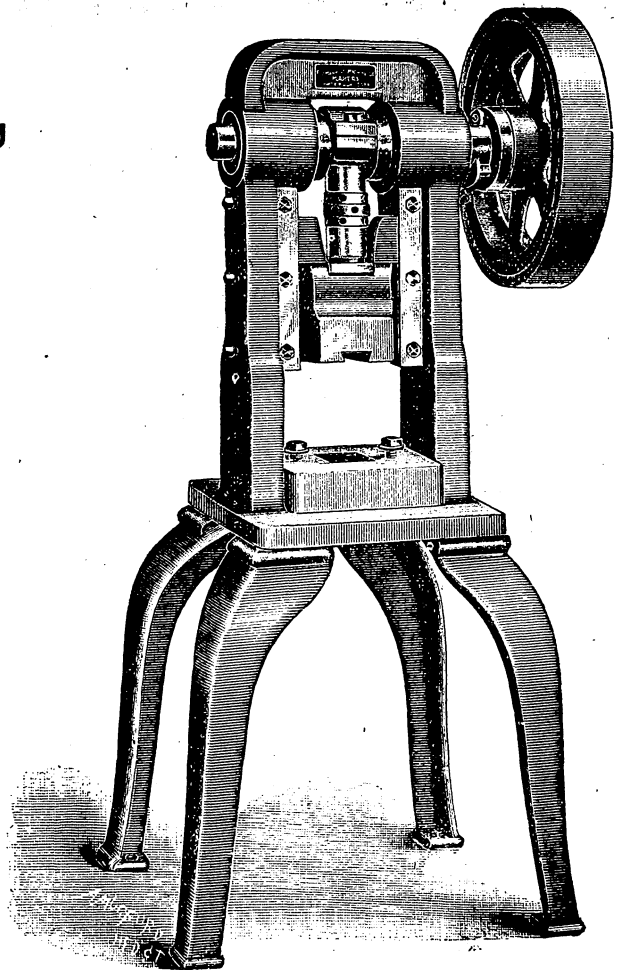
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RELAY RAILS

with splices. Also wanted second-hand equipment and scrap. Will purchase or handle on commission, as desired, cash advances made on consignments.

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2 11 in. x 5 ft. Raise and Fall Rest, Reed & Prentice. A1 order.
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 Relaying rails of all sections. Second-hand Out Rails for Builders' Use. Also a small second-hand Engine and Boiler for sale.

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225 H. P. Horizontal Slide Valve Engine, size 23 in. x 60 in. Perfect order. Also 50 H. P. "Wilbraham" 13 in. x 24 in. Horizontal Engine with fly wheel and band wheel. Return Tubular Boiler, Stack and Fixtures for this Engine. Also 16 in. 3-high Roll Housings and V-Pinion Housings. Pinions and Plate Rolls. Lot of 19 in. Rolls. 18 ft. Fly Wheel, weighing 20 tons. Cheap.

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A number of new factories have been induced to locate—largely through the instrumentality of this company—at towns on its lines. The central position of the States traversed by the Chicago, Milwaukee & St. Paul Railway makes it possible to command all the markets of the United States. The trend of manufacturing is Westward. Nothing should delay enterprising manufacturers from investigating. Confidential inquiries are treated as such. The information furnished a particular industry is reliable. Address

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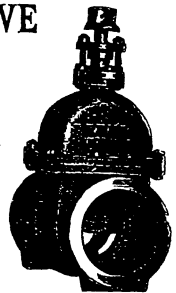
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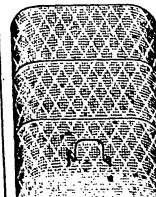
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A YOUNG MAN possessing the necessary personal qualifications and having \$10,000 to invest in interest bearing securities (not stock) can obtain a position as secretary of a large and long established manufacturing company. Please address reply to "CORPORATION SECRETARY," office of *The Iron Age*, 96-102 Reade St., New York.

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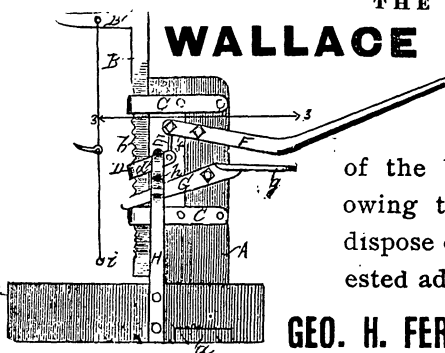
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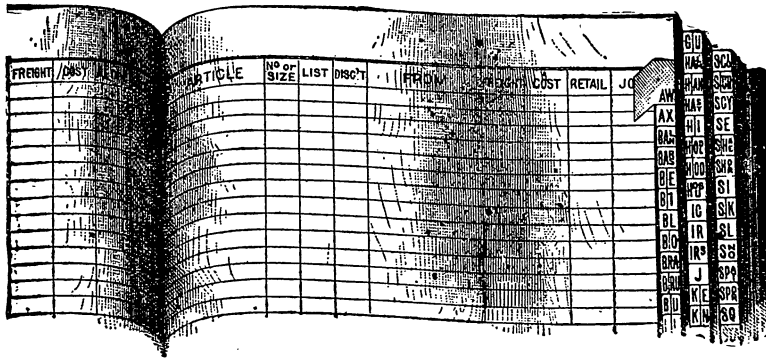
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The Iron Age Hardware Price Book E.

SECOND EDITION, REVISED AND ENLARGED, WITH MULTIPLE INDEX (Patent Pending).



AD GU SC
AN HA SCR
AU HAN SCY
AW HA SE
AX HI SHA
BA HO SH
BA HOO SI
BE HO SK

Fac-Simile of Indexing.

SIZE.—The book is 7 x 10 inches (much larger than Price Books A, B, C, or D), 350 pages.

PAPER.—The paper is the celebrated Crane's heavy ledger paper, tough and strong, permitting frequent changes and erasures.

BINDING.—The binding is of the very best quality—flexible seal grained leather.

INDEX.—By means of the arrangement shown in the cut the index applies to every page (except Supplement) and permits reference to any article at a single motion. This greatly facilitates the use of the book, avoiding the troublesome turning from page to page which is necessary in connection with other Price Books. It has been prepared with great care, and it is believed that it provides a place for every article in the Hardware line.

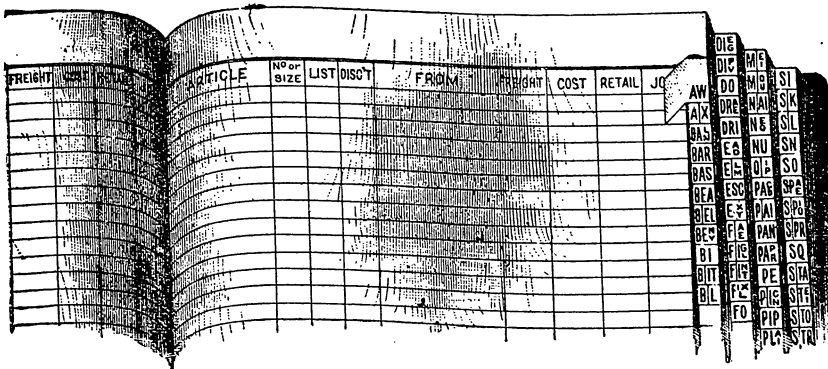
ARRANGEMENT.—The book is arranged to keep a complete record of prices on a single page, the width giving sufficient room.

SUPPLEMENT.—A 40-page Supplement is provided to give room for supplemental quotations, memoranda, tables, &c.

THIS BOOK IS ISSUED IN ONLY ONE EDITION, PRICE, \$5.00.

The Iron Age Hardware Price Book F.

WITH MULTIPLE INDEX (Patent Pending).



AD DI ME SI
AN DI MO SK
AU DO NAI SL
AW DR NE SN
AX DRI NU SO
BA EA O SPA
BAR EM PA SP
BAS ESC PAI SPR

Fac-Simile of Indexing.

SIZE.—The book is 8 1/4 x 11 inches (much larger than Price Books A, B, C, D or E), 556 pages.

PAPER.—The paper is the celebrated Crane's heavy ledger paper, tough and strong, permitting frequent changes and erasures.

BINDING.—The binding is of the very best quality—flexible seal grained leather.

INDEX.—By means of the arrangement shown in the cut the four rows of index applies to every page (except Supplement) and permits reference to any article at a single motion. This greatly facilitates the use of the book, avoiding the troublesome turning from page to page which is necessary in connection with other Price Books. It has been prepared with great care, and it is believed that it provides a place for every article in the Hardware line, and gives ample space for recording prices.

Sufficient space has been provided for large lines of goods such as Axes, Bits, Springs, etc., by allowing four pages to such indices, instead of two pages, as for lines of goods requiring less space. This is accomplished, as in AX for example, in Book F by having a short tab with the letter A on the tab on the first leaf, and AX on the tab on the second leaf. The A on the first leaf is directly over the A on the lower leaf, so that the index reads AX whether looking at both leaves together, or at the lower one only.

The four rows of index tabs are printed in gold letters on black Russia leather. The tabs are securely fastened on both sides of each page, making a handsome and durable index.

ARRANGEMENT.—The book is arranged to keep a complete record of prices on a single page, the width giving sufficient room.

SUPPLEMENT.—An 80-page Supplement is provided to give room for supplemental quotations, memoranda, tables, &c.

THIS BOOK IS ISSUED IN ONLY ONE EDITION, PRICE, \$7.50.

Advantages of Multiple Index Price Book.

A SPECIAL feature of the books is the arrangement of the index characters, which, instead of being alphabetical, are arranged with special reference to the classification of Hardware goods, each index character giving the first two or three letters of the names of Hardware articles as shown above. The ease and convenience with which the books can be used is indicated in the following examples, taken from Book F:

For Augers, turn to	AU	For Chisels, turn to	CH	For Iron, turn to	IRO
" Parers, Apple "	PAP	" Cutlery, "	CUT	" Irons, "	IR'S
" Saws, "	SAW	" Cartridges, "	CAR	" Shovels, "	SHO
" Pumps, "	PUM	" Rules, "	RUL	" Grindstones, "	GRI
" Bits, "	BIT	" Locks, "	LO	" Stones, "	STO

Special care has been taken to make the classification as indicated in the index correct and comprehensive, making provision for all Hardware articles and giving sufficient space for the keeping and recording of prices. It is thought that every strictly Hardware article has its first two or three letters given, thus permitting immediate reference to it by a single motion.

It is, however, obvious if any articles are not directly designated by the index characters, that the index, being alphabetical in its arrangement, indicates the place where quotations on such articles should be recorded. The supplement, however, may be found useful for quotations on any outside goods which the Hardwareman may desire to keep prices on, while at the same time it may be used if necessary for any overflow of matter from the preceding pages, or to contain list prices or other matter relating to goods.

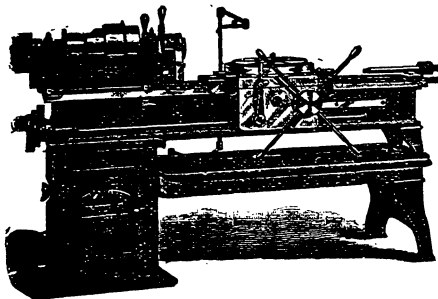
Hardware Classification.—A pamphlet containing a classification of the leading Hardware articles is furnished with the price books.

Standard Lists.—In connection with these price books a set of *The Iron Age* STANDARD HARDWARE LISTS can be used with great advantage. Price 25 cents.

These price books, which have been prepared by R. R. Williams, Hardware Editor of *The Iron Age*, are presented to the attention of Hardware men in the confidence that they will be found a most valuable aid in keeping track of prices.

Sent, Post-paid, on Receipt of Price, by

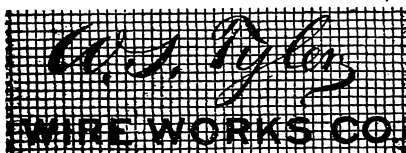
DAVID WILLIAMS, Publisher, - 96-102 Reade St., New York.



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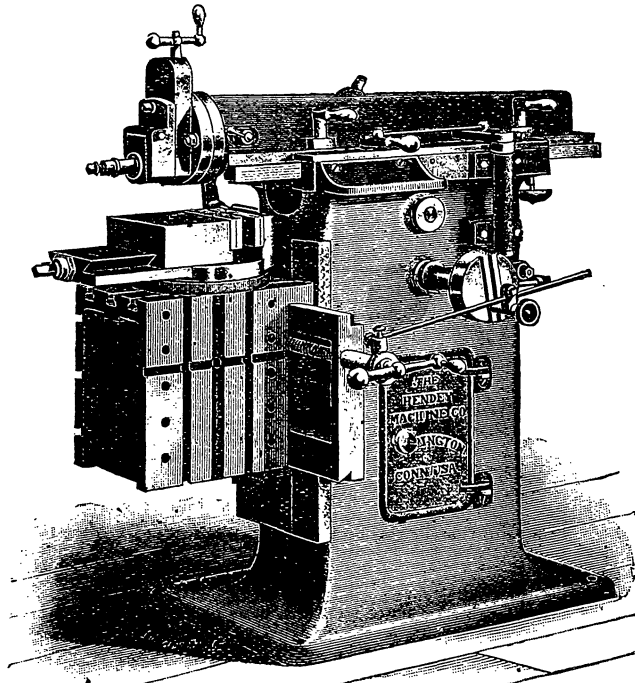
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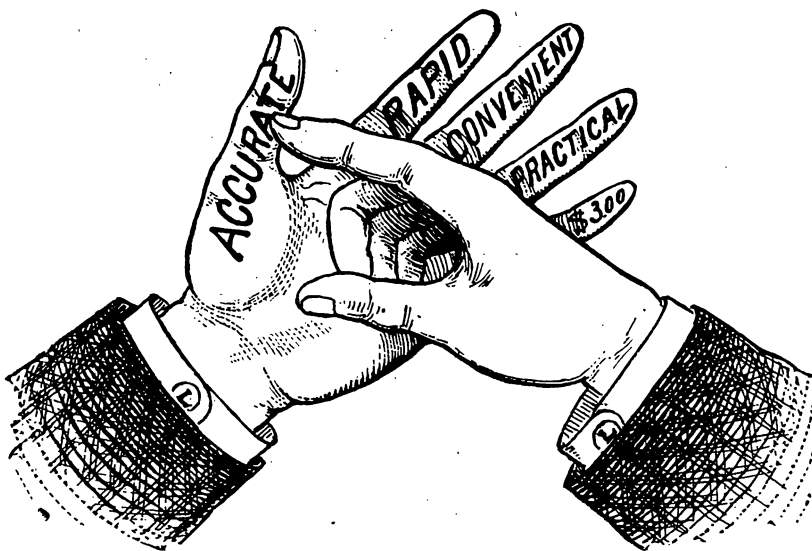
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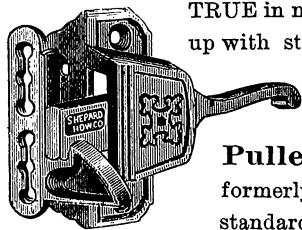
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Inquire of any leading jobber or write us.

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TRUE in many instances. But it's no VENTURE when you stock up with standard goods and you HAVE that which you can sell.

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Pulleys of the original "CLARK" and other patterns formerly sold by the SHEPARD HARDWARE CO. are standard goods, the best sellers, and the best known.

We are now the only manufacturers of these goods.

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Of few parts.

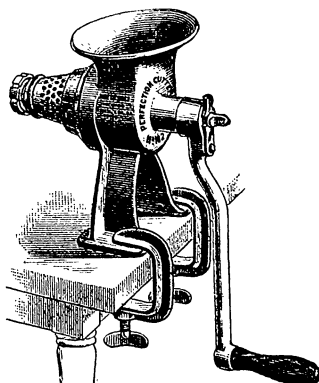
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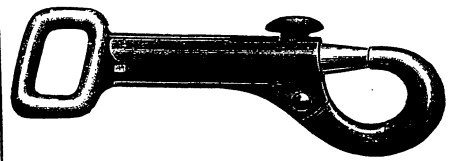
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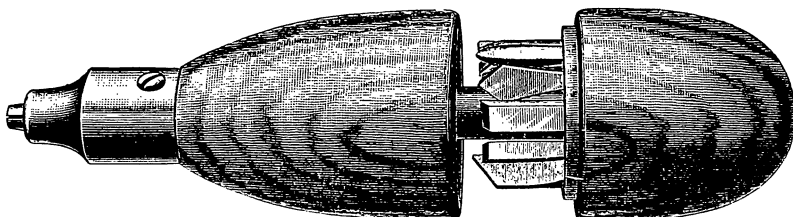
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Tool Holder No. 6.



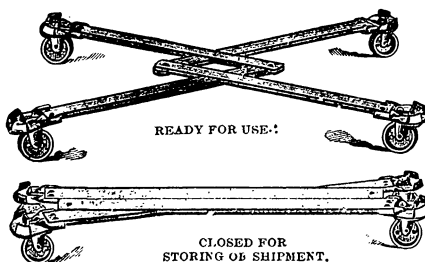
This handle is arranged with separate cell for each tool, as shown in the cut. It is made from cocobola wood, with the metal or chuck end nickel plated. The finish of the whole tool is of the very best, and it presents an attractive appearance. The tools, twelve in number, are of same quality as those put up with our Nos. 1, 4 and 5 handles.

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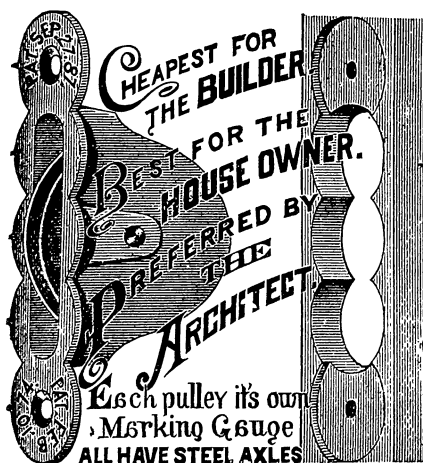
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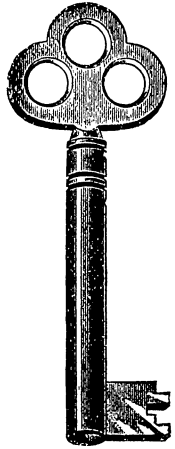
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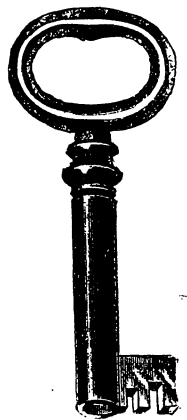
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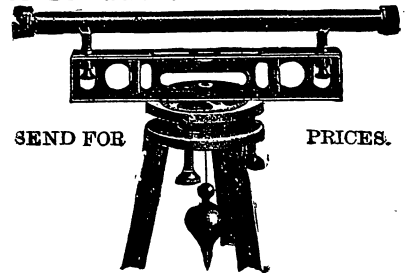
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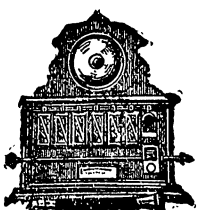
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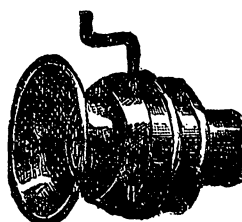
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Fig. 200.

Fig. 281.

Fig. 145.

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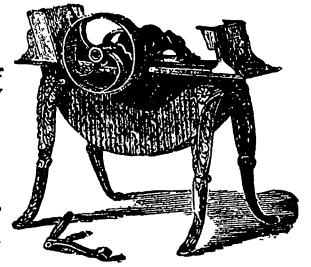
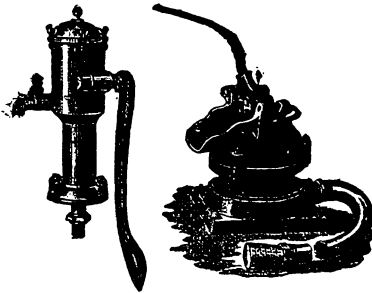
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from 3,000 to 4,500 gallons per hour.

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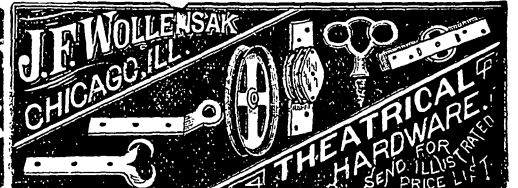
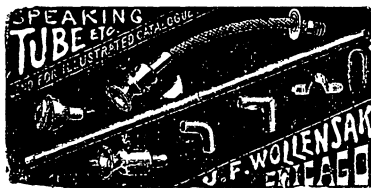
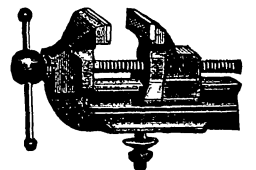
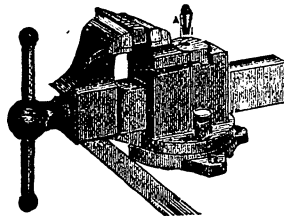
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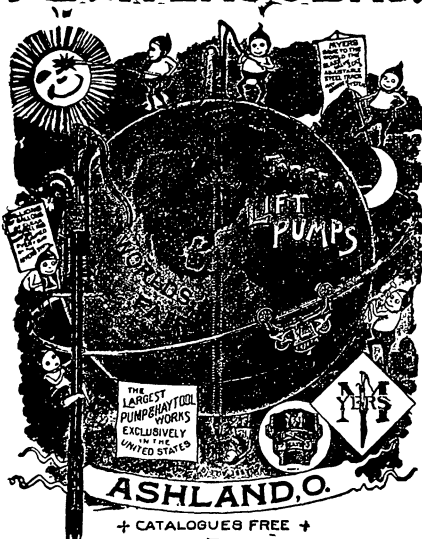
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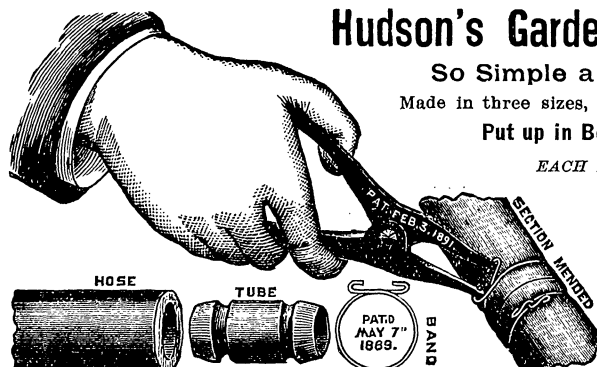
1 Pair Pliers,

20 Bands,

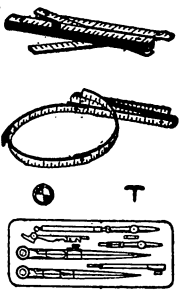
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Sells readily at 75 cents.
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Send for Full Description.



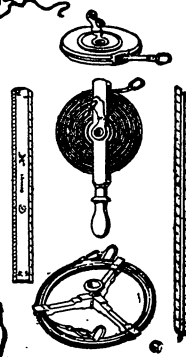
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SUPERIOR QUALITY, LATEST IMPROVED. GREATEST VARIETY.
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EVERY TOOL WARRANTED.
Catalogue Free.

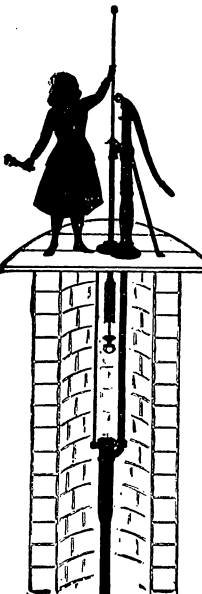
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Specially adapted for drill press work where chucks cannot be used and equally good for special or regular bench work.

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Manufacturers all styles VISES.



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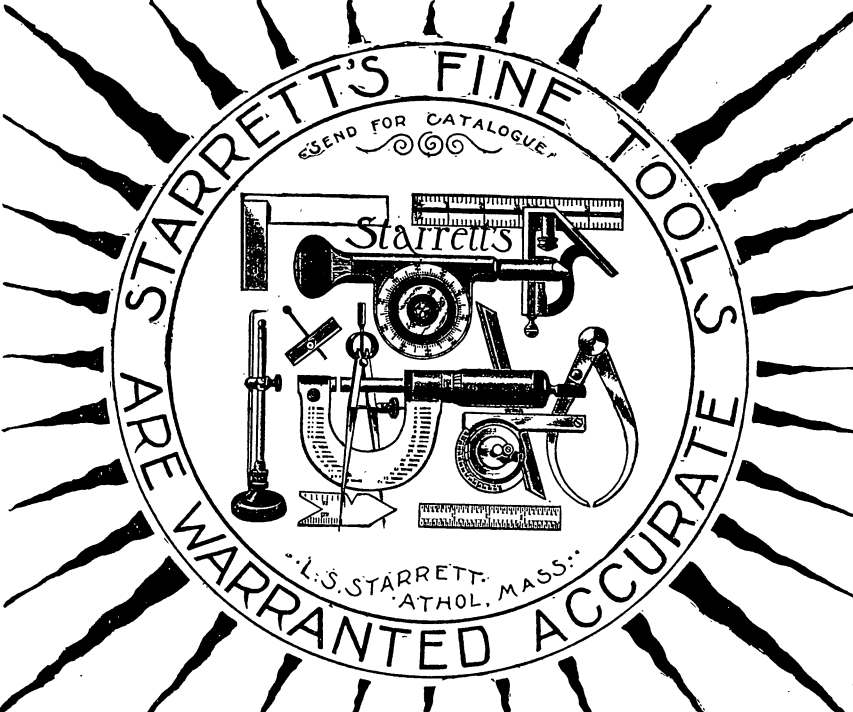
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Manufacture the
Only Pump

in the U. S.
that works easily in wells of any depth, and can easily be fixed by any one with a monkey wrench without taking the pump from well or tearing up the platform.

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L. S. STARRETT, ATHOL, MASS.
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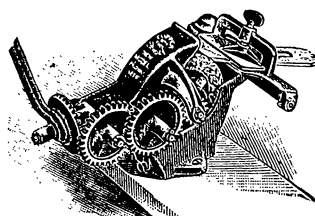
The Taintor Positive Saw Set.

Mechanics are now inquiring for this tool, and Hardware Dealers should have them in stock, or at least have a sample.

For Prices and Discounts, address

WIEBUSCH & HILGER, LTD., SOLE AGENTS,
84 and 86 Chambers Street, **NEW YORK.**

CLIPPER GRINDERS.

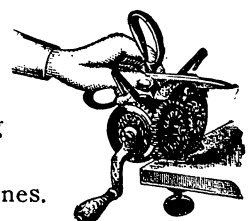


We make five sizes, Nos
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No. 1 for joiners' use.

Nos. 2 and 3 for grinding
scissors and knives.

Nos. 4 and 5 power machines.



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OPERATING

Wheeler, Madden & Clemson Mfg Co., Wood-rough & McParlin, Richardson Brothers, Harvey W. Peace Co., Monhagen Steel Works, Wood-rough & Clemson, Pennsylvania Saw Co.

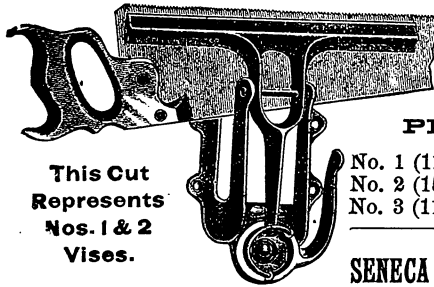
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GENERAL OFFICE:

NEWARK, - - New Jersey,

SAWS

WENTWORTH'S PATENT NOISELESS SAW VISES, WITH RUBBER CUSHIONED JAWS.



This Cut
Represents
Nos. 1 & 2
Vises.

Prevent all vibration and render Saw Filing noiseless.
Will make no more noise than Filing on a Solid Piece of Iron.

Have a Larger Sale than All Other Kinds Combined.

PRICE LIST.

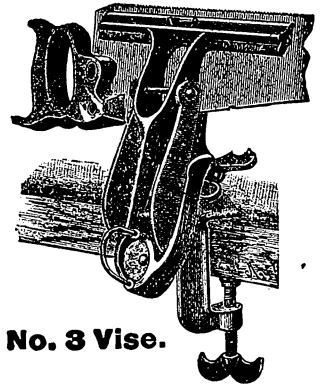
	PER DOZ.
No. 1 (11 inch Jaws),	\$15.00
No. 2 (15 inch Jaws),	21.00
No. 3 (11 inch Jaws),	18.00

LIBERAL DISCOUNT TO THE TRADE.

LONGEST JAWS, HEAVIEST AND
BEST FINISHED.
Sold by all leading jobbers of general
Hardware at Factory Prices.

—MANUFACTURED BY—

SENECA FALLS MFG. CO., 255 Water St., Seneca Falls, N. Y.



No. 3 Vise.

E. C. ATKINS & CO., Indianapolis, Ind.

BRANCH HOUSES:
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Circular, Band, Cross-Cut and Hand Saws.

Diamond.
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THE BEST SAW IN THE WORLD FOR THE MONEY.

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Fine Steel, Patent Temper.

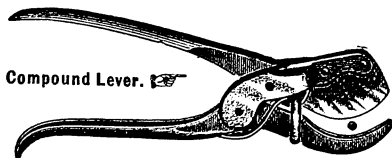
Furnish your Trade with the Best Saws.

The ATKINS Saws Lead them all.

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"PERFECT" PRUNING SHEARS.



Compound Lever.

A strictly first-class tool, entirely new in construction. Has a rapid action that produces a clean cut with twice the ease of other shears. Try a sample order and prove its superiority. We give it our full guarantee.

Our line comprises Lawn Rakes, Garden Rakes, Lawn Sprinklers, Post Hole Diggers, Curry Combs, etc.

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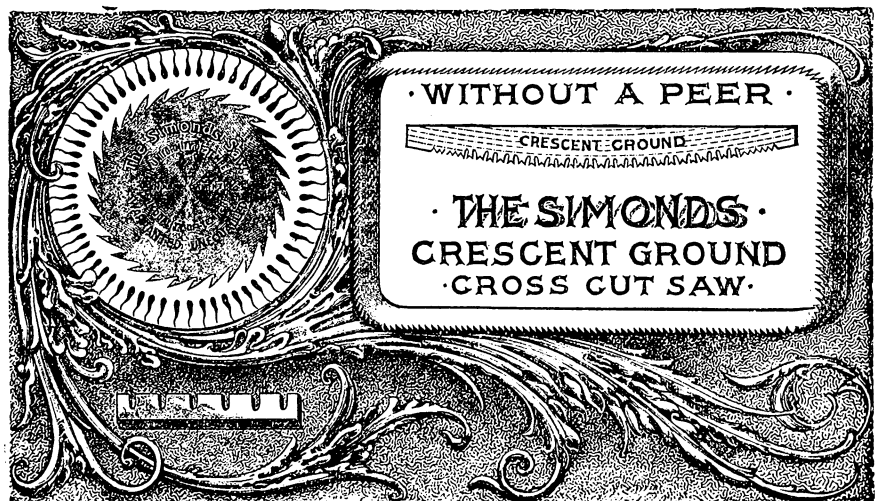
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WE MAKE ONLY

The Very Highest Grade

OF
MECHANICS' TOOLS.

H. H. MAYHEW CO., Shelburne Falls, Mass.



· WITHOUT A PEER ·

CRESCENT GROUND

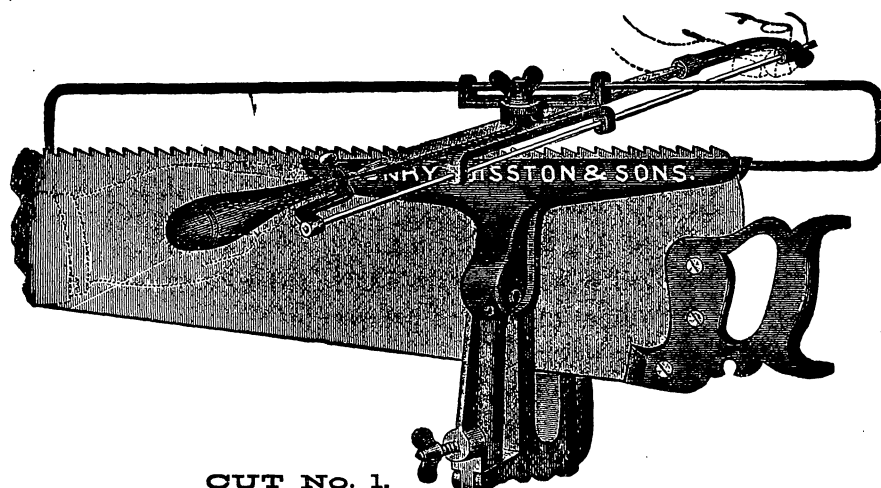
· THE SIMONDS ·
CRESCENT GROUND
CROSS CUT SAW.

Simonds Mfg. Co. Simonds Saw Co.,

FITCHBURG, MASS. CHICAGO, ILL. SAN FRANCISCO CAL. PORTLAND, ORE.

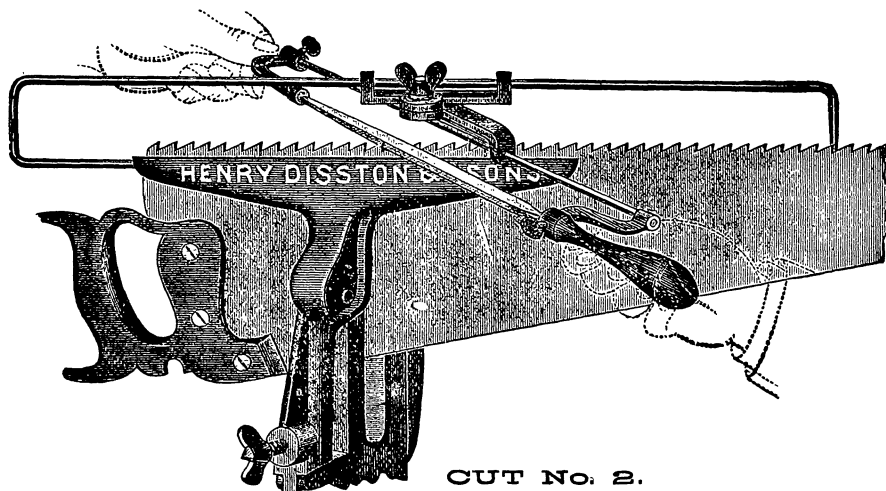
DISSTON'S Improved Saw Clamp AND FILING GUIDE.

ESPECIALLY DESIGNED TO ASSIST THOSE NOT SKILLED IN THE ART
OF SAW FILING TO FILE A SAW CORRECTLY.



CUT NO. 1.

Cut No. 1 shows a saw and the attachment in proper position for filing the first side; and Cut No. 2 shows the saw and attachment reversed and in position to file the second side. There are three marks on one of the hubs of the swivel attachment, and one mark on the other. One of the three marks shows when it is in position No. 1, and the other designates when it is in position as shown in No. 2. The third, or centre, marks show when it is in position for filing Rip Saws.



CUT NO. 2.


To obtain the correct position, loosen the wing nut and move the guide around to the point desired; after tightening wing nut, loosen screw in file handle, then turn handle until file gives the shape tooth wanted.

A good way is to select a tooth of correct shape and let file down into it, tighten set screw in handle, then file a tooth to see if the shape suits. If not turn the file a little to the right or left and try another tooth until the proper shape is obtained. Then file every other tooth, see cut No. 1; when one side is filed, reverse saw and attachment and adjust as in No. 2, and file the other teeth. For Rip Saws, place the file at right angles with the saw and file every tooth. Always keep the file as nearly horizontal as possible.

This filing guide is sold only attached to our No. 3 Improved Clamp or Vise, and not sold separately. We recommend this as the best saw clamp on the market, being quickly and easily adjusted, and not liable to get out of order.


Write for price including No. 3 Clamp, Filing Guide, File and Handle complete: Packed one in a wooden box.

Henry Disston & Sons, Philadelphia, Penn. INCORPORATED.



ARCADÉ FILE WORKS.

WARRANTED FILES AND RASPS.



**EASTERN OFFICE.
NEW YORK.**

**FACTORY,
ANDERSON, IND.**

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THE FILES THAT LEAD THEM ALL

THE BEST EQUIPPED FILE WORKS IN THE WORLD.

The fact that the Arcade File Works alone use the improved File Machinery recently invented by Alfred Weed, and the even heat of natural gas, enables them to produce files that cut faster and wear longer than any on the market.

Send for our Catalogue of

FINEST

**TOOLS for
MECHANICS,**

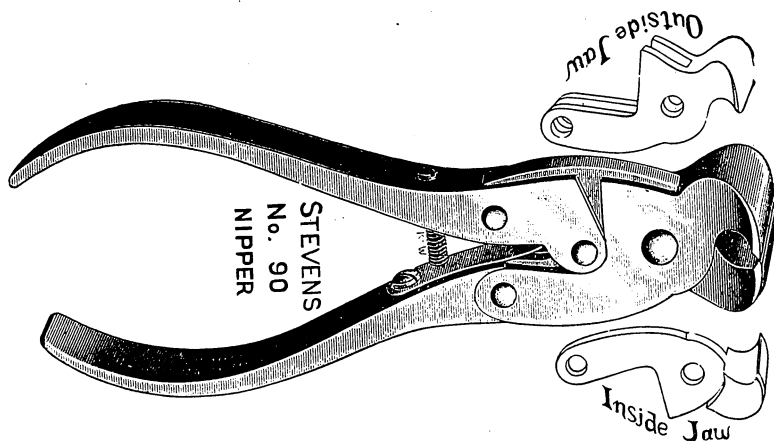
Calipers,
Dividers,
Surface Gauges,
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J. Stevens Arms & Tool Co.,

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THE STEVENS NIPPER.



Wire can be cut at either extreme end of Jaws without the opposite end closing faster than the cutting end, as is the case with all other compound nippers. Will cut Music Wire.

HOW TO KEEP A STORE.

By S. H. TERRY.

406 PAGES, 5x7 1/2 INCHES.

This book should be in the hands of every one interested in the selling of goods at retail. Among the subjects discussed are: The selection of a business; choice of a locality; buying a stock of goods; examining, marking and arranging goods; how to advertise; employment of clerks; selling for cash and credit; keeping accounts; expenses; copartnerships; losses by fire, theft, &c.; influences of social life on business; buying at auction; investment of profits; insolvency; business qualifications. Every branch of the retail trade is treated upon in a direct, business-like manner. It is a thoroughly practical book for merchants and clerks. **Price, \$1.50.**

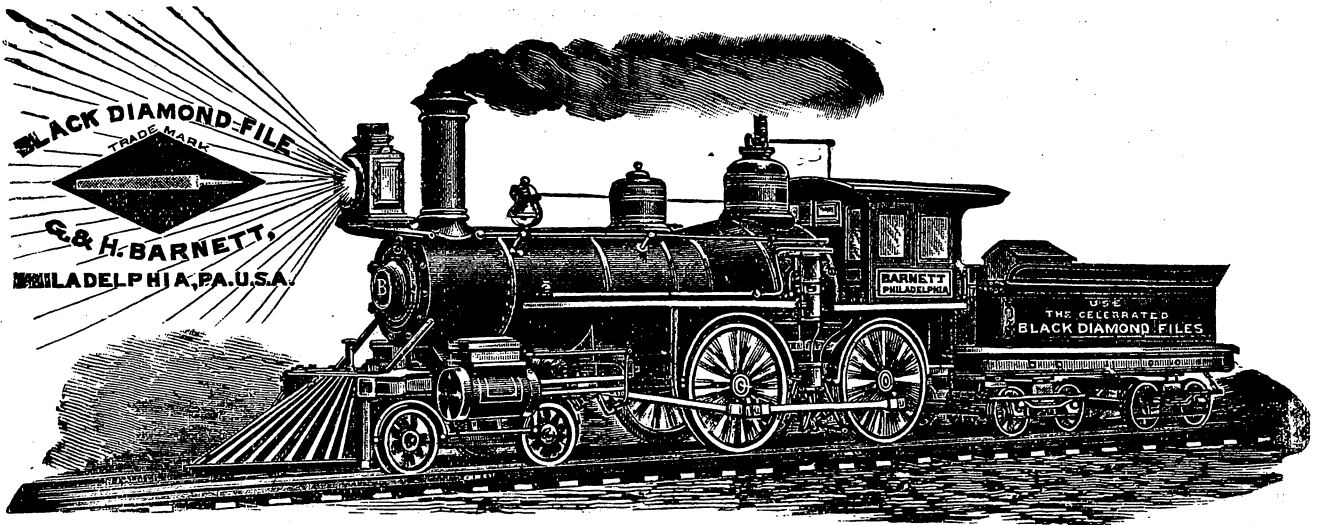
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THE LARGEST AND MOST COMPLETE FILE WORKS IN THE WORLD.

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3000 VARIETIES FILES
[X.F.] AND INCREMENT CUT FILES

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WATERFORD, N. Y.

Manufacturers of **BUTTON'S**



Pat. Wire Cutter AND PLIER COMBINED.

Specially Adapted for Use on Wire Fence.

Also Manufacturers of BLACKSMITHS' and MACHINISTS' STOCKS and DIES, PLUG and TAPER TAPS, HAND, NUT and SCREW TAPS, PIPE TAPS and REAMERS.

Price-List on Application.

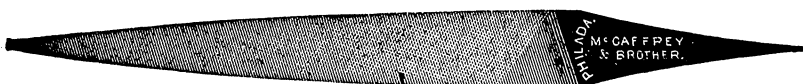
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Philadelphia, 1876.



McCaffrey File Co.,
FIFTH and BERKS STS.,
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For Superiority.



Manufacture and keep in stock a full line of FILES and RASPS only, for which we claim special advantages over the ordinary goods, and ask domestic and foreign buyers to allow us to compete for their trade.

Superiority acknowledged wherever used, sold or exhibited.

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BUFFALO, N. Y.

Manufacturers of

BENCH VISES.

Price Lists sent on application.

3 NICKLE, Silver and Bronze Metallic Figures and Letters, Sizes $\frac{1}{4}$ in to 3 in. Pattern Letters, Steel Stamps, Brands, Dies &c. Send for Reduced Price List. We make a specialty of the Hardware Trade. A. A. WHITE & CO., Providence, R.I.

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BEST "TROJAN" HORSE RASPS AND FILES.

LOWEST
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CRUCIBLE
STEEL.



STRONGEST
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BANKER & WHITE,

TROY, N. Y.

(Troy File Works.)

N. Y. Agent, GEO. M. MATTESON, 111 Duane St.

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QUOTE.

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John Wilson's Butchers' Knives and Steels, Skinning, Sticking, Farriers' & Shoe Knives,

Have established and maintained their reputation, for superiority,
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THE YEAR SEVENTEEN HUNDRED & FIFTY,
and are still in increasing demand. As in the past, it is the unalterable
DETERMINATION OF THE HOUSE TO SEND OUT NOTHING BUT WHAT IS OF THE HIGHEST POSSIBLE QUALITY.

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Up or Down,

It matters not which when you use the
AMIDON CORNER BRACE.



The Amidon Tool Corporation,
Manufacturers of
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AMERICAN TOOL COMPANY,
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MANUFACTURERS OF

TOOL CHESTS

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Also Machinists' Tool Chests, empty. Illustrated Cata-
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We make all kinds of Paper Boxes, Cartons, Fold-
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HARDWARE AND GENERAL AGENT.

(FIRST-CLASS REFERENCES.)

60 PRINCE WILLIAM ST., ST. JOHN,
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Carriage Forgings

Of every description. Also Special
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Boxes Made Absolutely Secure
BY USING THE PORTABLE
BOX BANDER

ONE MAN CAN BAND
YOUR BOXES QUICKER THAN TWO
MEN CAN IN ANY OTHER WAY.

HOOP IRON WIRE OR ANY OTHER FLEXIBLE MAT-
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ESTABLISHED 1816.

WHITE, VAN GLAHN & CO., CHATHAM SQUARE, NEW YORK, HARDWARE JOBBERS.

Lawn Mowers, Farming Tools and Barb Wire, W. V. G. & Co. Shovels, Spades and
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Office, 35 Barclay St. Warehouse, 40 Park Place, New York.

Carry Stock of Jackson, Mich., Farming Tools

Shipments from Factory if preferred.

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But without a GOOD WHETSTONE they are an impossibility.

That is why it is always economy to buy

PIKE'S WHETSTONES.

Pike's Indian Pond Scythe Stone, Strong, Sharp
Grit, Quick Cutting.

Scythe Stones.

Oil and Water Stones.



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WILLIAMSON'S NEW POWER CORK SCREWS.
KEEP ON TURNING, DO NOT PULL.

No. 1243, Nickel Plated, Apple Wood Handle, \$5.00 per dozen.
1443, Rosewood 5.50

For Discounts and Prices of other styles send for Catalogue.

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Manufacturers of Wire Specialties for the Trade





EVERYBODY knows that **TORREY RAZORS** are **STANDARD** for quality and finish, **BUT** do all dealers realize that these goods can compete with even foreign makes?

TO PROVE THIS

A sample dozen Torrey Razors, assorted, to retail from **50 cents** to **\$2.50**, will be sent on approval to any responsible hardware dealer mentioning this advertisement.

A Special Offer, 100 per cent profit for the dealer.

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"Stamped with the **BUCK'S HEAD**."

BUCK BROTHERS, MILLBURY, MASS.

The Most Complete Assortment in the U. S. of
Shank, Socket Firmer and Socket Framing
Chisels, Fine Bevel Edge Chisels, Plane Irons.

TWO PRIZE MEDALS,

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Buyers are cautioned against any parties who claim a recent connection (or any connection for over 20 years) with Buck Bros., or who represent goods as our make not stamped with the **BUCK'S HEAD** or **BUCK BROTHERS** in full.

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MANUFACTURERS

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Cleavers, &c. Full Line Chisels.

EDGE TOOLS.

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Highest Awards at the World's Exposition for Superior Tools.



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Manufacturer of the

GENUINE STANDARD BUCK TOOLS

All kinds of Shank, Socket Firmer Chisels and Gouges, Cut and Double Irons, S. D. Bits, etc. Send for Catalogue. **CAUTION.**—Buyers wanting the standard Buck Tools will see that they get only those stamped **CHARLES BUCK** when ordering from the jobbing houses. Address all correspondence to **CHARLES BUCK** or the

Millbury Edge Tool Works, Millbury, Mass.

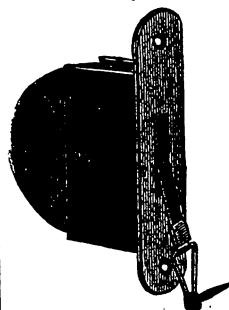
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ACME SHEAR CO.,

BRIDGEPORT, - CONN

PULLMAN Steel Frame Sash Balance.

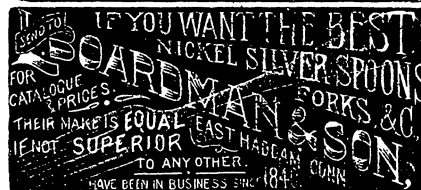
Oldest and largest producers of a perfect working Spring Sash Balance in the world. Every Balance warranted. Require no box frames. Our prices lowest, our Balance the best. For sale by all leading Hardware dealers in the United States.



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New York Office, 142 Chambers St.
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A POLITICAL PULL

Is a good thing to have if

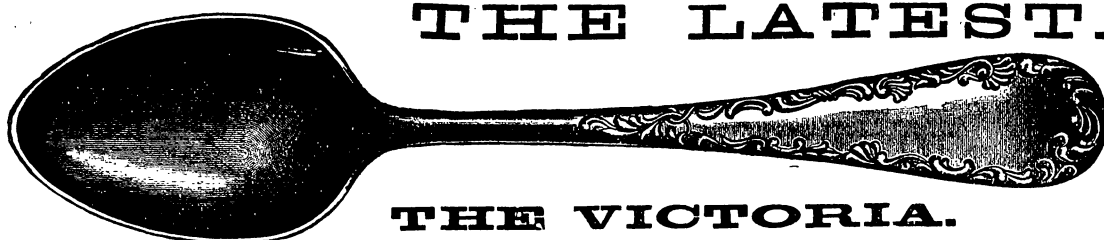
it works. It's no use in opening boxes. You need for that work a **BLACK HAWK NAIL PULLER.**

Of all jobbers at \$12 a doz.

American Specialty Co.,
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Depreciation of Factories, Mines and Industrial Undertakings and their Valuation.
By EWING MATHESON. Second edition. 143 pages, 8vo, cloth.... \$8.00
For sale by David Williams, 96-102 Reade St., N. Y.



We have a full line of above, which is the neatest pattern ever presented to the trade, and it is stamped



NONE GENUINE WITHOUT THIS TRADE-MARK.

WM. ROGERS MFG. CO., Offices, Hartford, Conn.
 FACTORIES HARTFORD, CONN., NORWICH, CONN., AND TAUNTON, MASS.

Quality or Price?

Don't sacrifice quality for price. Don't pay too much for quality. You do neither by buying of us. The name of a reliable manufacturer on goods is worth more than it costs.



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Send for REVISED CATALOGUE. Every wide awake dealer should have it.

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 SALESROOM,



122 Chambers
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NORTHAMPTON CUTLERY COMPANY, Manufacturers, Northampton, Mass.

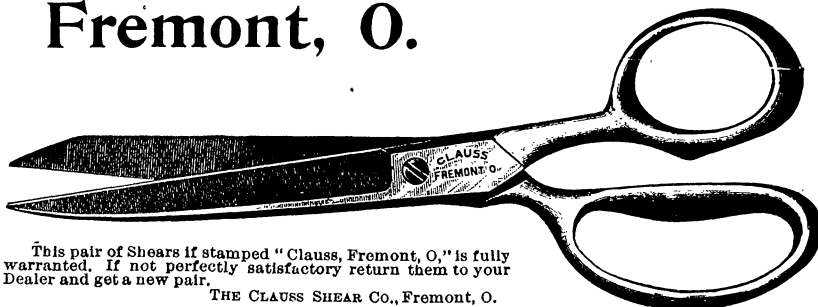


Patent Scale Pocket Knives, Specially Suited for Jobbing Trade.
 CATALOGUE ON APPLICATION.

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Fremont, O.

Clauss



This pair of Shears if stamped "Clauss, Fremont, O." is fully warranted. If not perfectly satisfactory return them to your Dealer and get a new pair.

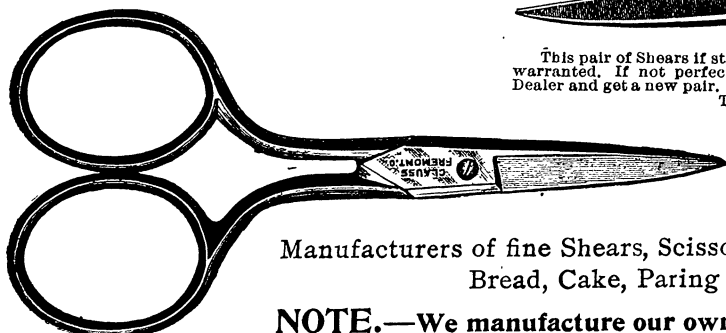
THE CLAUSS SHEAR CO., Fremont, O.

THE CLAUSS SHEAR CO.,
 Fremont, O., U. S. A.,

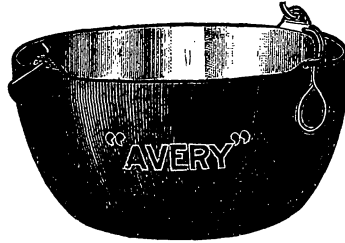
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Manufacturers of fine Shears, Scissors, Tinnets' Snips and The Celebrated Clauss Bread, Cake, Paring and the Perfect Carving Knives.

NOTE.—We manufacture our own Scissors.



Steel
Spiders,
Griddles,
Kettles,
Maslins,
Scotch Bowls,
Stew Pots,
Stew Pans,
Etc.



The Avery Stamping Co.,
Cleveland, Ohio.

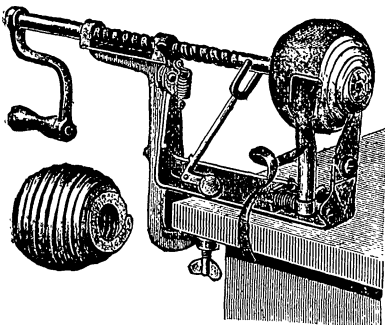


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FAYETTE R. PLUMB, Philadelphia.

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YOU
WANT

APPLE PARERS

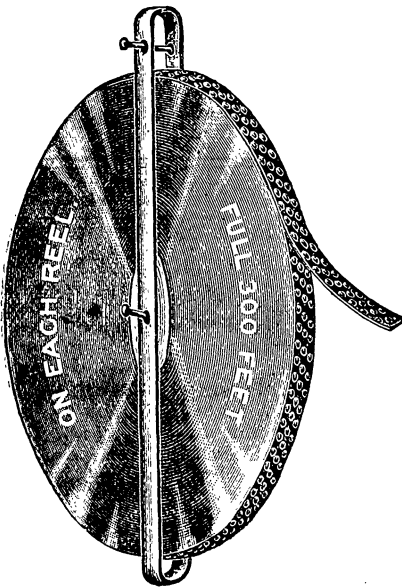


We have all kinds, from seventy-five cents to twenty dollars each.

Our machines received highest award at the World's Fair. We are the oldest and largest manufacturers of Apple Parers in the world, and we make a larger variety than all others combined. If you are in need of Apple Parers write us. Our machines are sold by the jobbing trade everywhere.

GOODELL COMPANY,

ANTRIM, N. H.



TROJAN STRAP.

Metal Strap coiled or in lengths from 4 to 12 feet. $\frac{1}{2}$ in., $\frac{3}{4}$ in. and $\frac{1}{2}$ in., and 1 inch wide of the toughest and best stock on the market.

Three Good Specialties for the
Shipping Department.

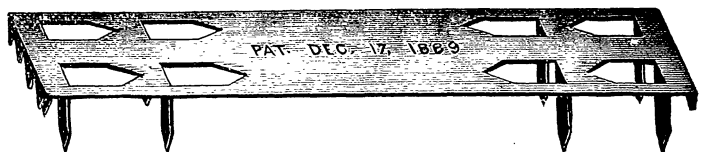
SELF-DRAWING WIRE STRAP.



Patented December 13, 1887.

A flat wire strap that lies close to a box and makes a neat finish, having a split and spread hole every three inches, the nail being driven spreads open walls of said holes, contracting length of strap.

CLUTCH NAIL.



Clutch Nail or Corner Iron, for protecting corners and sealing cases. For Holding them when they spring in the center by heavy packing. Also to be used where a nail will not hold, and numerous other places.

THE DEHAVEN MFG. CO.,

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A practical means of rapidly reaching absolutely accurate results without the mental wear of computing.

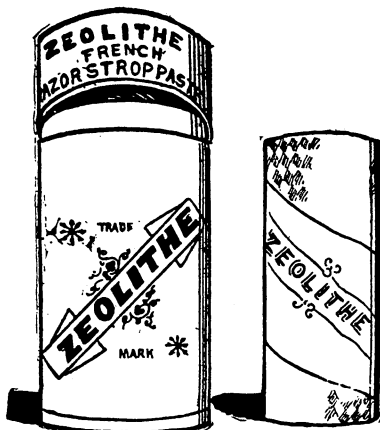
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It gives at a glance the net of any sum at a great range of discounts, simple and complex, and it is accurate, rapid and practical. Price, \$3.00; Double Indexed Edition, \$4.00.

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NO MORE DULL RAZORS!

ZEOLITHE



Puts the keenest edge on the dullest razor. It has been thoroughly tested and its

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It is put up in an attractive manner and sells on sight. Send for samples and prices to the Sole Selling Agents,

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THE SAMUEL WINSLOW SKATE MFG. CO.,

Worcester,

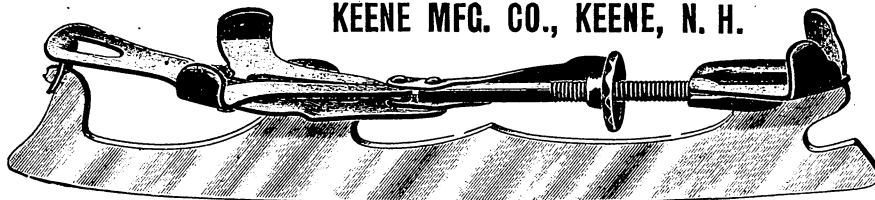


Mass., U. S. A.

The most extensive Skate Factory in the World.

LONG REACH ICE SKATES. Complete Line of Ice Skates, From the Cheapest to the Finest.

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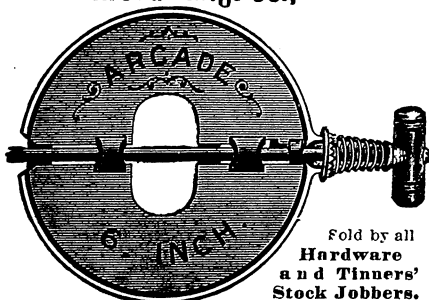
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The McIntosh-Huntington Co., Cleveland, Ohio.
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BOSTON, MASS.
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THE NEW "PROTECTOR" REVOLVER

A 7-SHOT, 32 CALIBRE, STANDARD CARTRIDGES.



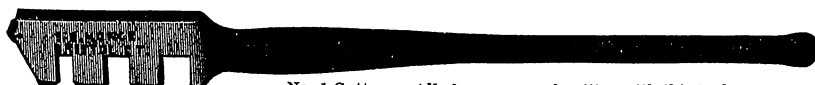
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COMPACT! EFFECTIVE!

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No. 1 Cutter. All glassmen are familiar with this tool.

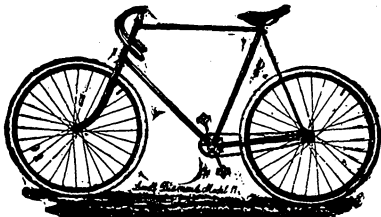
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**Butcher Knives, Pocket Knives,
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Butchers' Steels, Scissors,**
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ARE THE BEST.

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RACER-WEIGHT 19 LBS.

HIGHEST GRADE.

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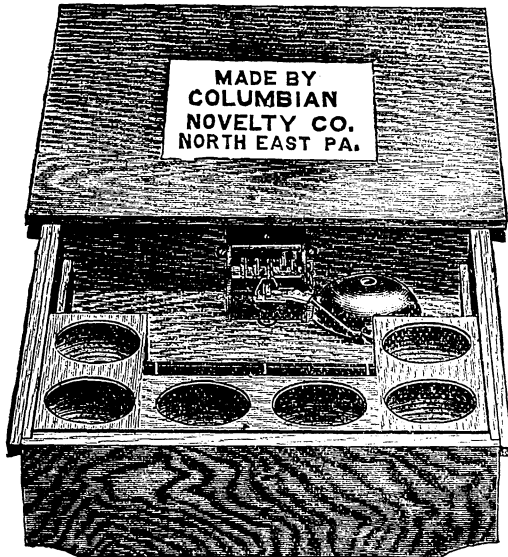
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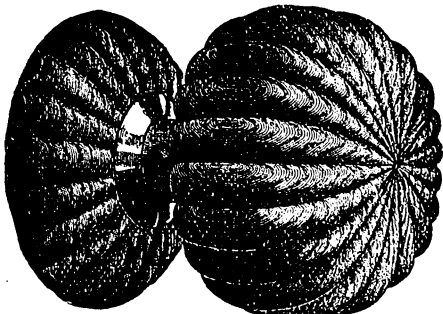
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This Cash Till is beyond question the best Till for the purpose on the market, combining as it does a greater number of changes, simplicity and convenience, and above all, superior workmanship and material in its construction.

Packed one-half dozen in crate.

Prices quoted on application.

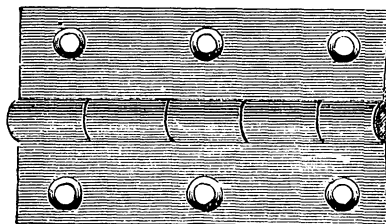


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DOOR SPRINGS AND CHECKS
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NEW GOODS. NEW PRICES.

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**BRASS, GALVANIZED & SHIP CHANDLERY
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To Make a Bull's Eye

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If you deal in ARMS or AMMUNITION or shoot a Rifle, Pistol or Shot Gun, you will make a HIT by sending for the IDEAL HAND BOOK.

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Please mention *The Iron Age* when you write.



Clipper Bicycles

are built to please the dealer and rider.

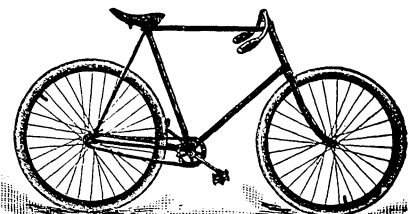
Are you in the bicycle business? If not, you can make it pay to handle Clippers. Buy direct from the manufacturer and save the jobbers' profit. It will add considerable to your bank account. We want responsible dealers only. We may be able to interest you, in fact we are sure of it. Our policy is a protective one, and will please you. It protects against Scalpers and "Curb Stone Brokers."

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GRAND RAPIDS, MICH.

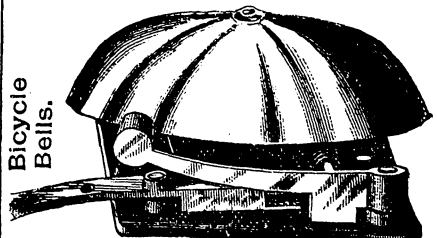
RIDE A TRIBUNE.

THAT'S THE WHEEL!



Write for Catalogue and Agency.

THE BLACK MFG. CO., - ERIE, PA.



Bicycle Bells.

BEVIN BROS. MFG. CO., Easthampton, Conn.,

Manufacturers of

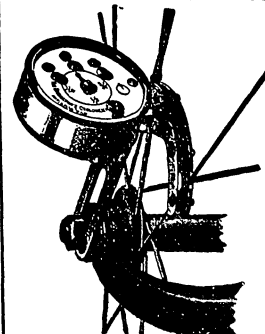
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BRIDGEPORT CYCLOMETER. \$3.50.

Registers 1000 miles accurately and repeats, or can be set back to zero at any time. Perfectly Noiseless, Dust Proof and Water Proof. Nothing to get out of order and can be adjusted to any wheel. A high grade cyclometer within the reach of every bicyclist.

PRICE \$3.50.

Made in two sizes, viz.: for 28-inch and 30-inch wheels. Send for catalog of sundries. Sold by all bicycle dealers. Cyclometers will be ready for delivery April 1.



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"Puritan"

Cookers,
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"NEVER-BREAK"

Seamless
Steel
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Stew Pans, etc.

"Excelsior"

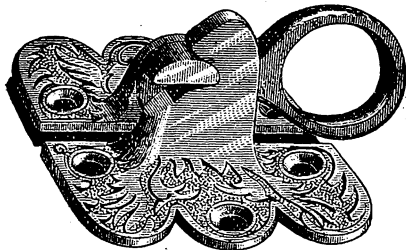
Steel
Baking
and
Roasting
Pans.

Write for Catalogue and Discounts.

THE BRONSON SUPPLY CO., - - - NEW YORK and CLEVELAND.

"CONROY"**Refrigerator Door Fasteners**

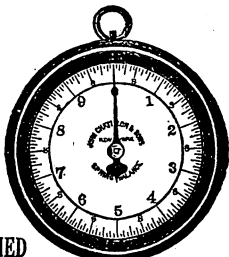
Have rapidly supplanted all others.
Refrigerator Trimmings.



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John Chatillon & Sons,

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ESTABLISHED
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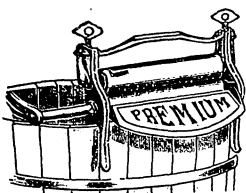


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Premium Wringer,

With Automatic Apron Adjustment.

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Light your Streets and Driveways.

The S. G. & L. CO.

Tubular Globe Street Lamp

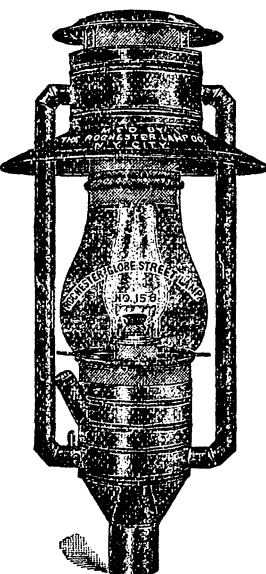
IS THE Best Street Lamp Manufactured.
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Will not Blow Out in the Strongest Wind.
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Automatic Extinguisher.
Outside Wick Regulator.
Will Burn Four Hours for One Cent.

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The Rochester Globe Tubular - - Station and Street Lamp.

It's a long name, but it tells a good deal. It tells you of a new Street Lamp with "The Rochester" Central Draft Burner. A central draft burner (round flame) gives three times the light of an old style flat-wick burner. The first and only Tubular Globe Central Draft Lamp ever made! Storms, rain, snow, sleet or hail do not affect it. Burns all night. Made with either bail or post socket, with 26 inch enamel reflector if wanted, for railroad and other uses. Takes regular No. 3 or 9 street lamp globe, to be had everywhere. For Railroad Stations, Ware-rooms, Mills, Docks, &c., it is the best lamp ever made. Price, \$6.00; send for trade discount.

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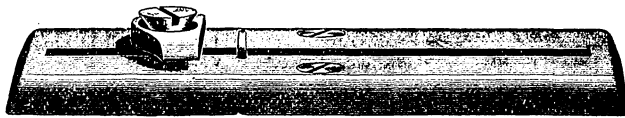
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42 PARK PLACE, } NEW YORK.
37 BARCLAY ST., }

This is the "SALEM" HANGER.

And when it is on the window casing, a TEN-ANT can put up ANY SHADE FIXTURE that is made without using a screw. THE MAN INTERESTED is the owner of the house. THE MAN to sell the "Salem" to the owner IS THE HARDWAREMAN.

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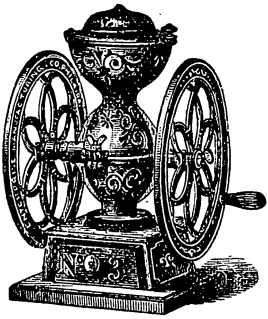
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THE ENTERPRISE M'F'G CO. OF PA.

THIRD AND DAUPHIN STREETS, PHILADELPHIA.

COFFEE MILLS.

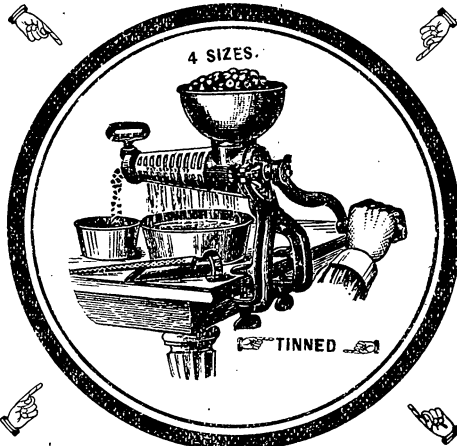
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\$1.25 to \$100.00.

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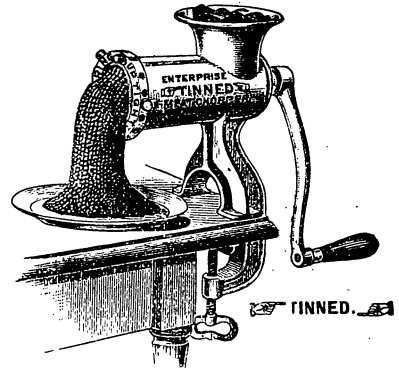
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No. 24, Price, \$3.00

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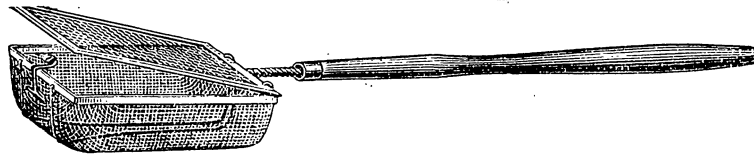
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\$2.00 to \$275.00.

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Low Prices and High Quality.



Our styles of Corn Poppers are guaranteed to be all of the latest and best.

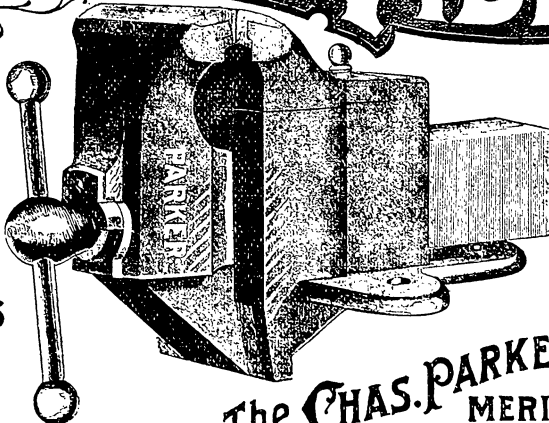
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Dealers everywhere are entitled to New Catalogue and New Prices.

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ESTABLISHED 76 YEARS.

PARKER VISE

HAS STOOD
THE TEST
OF OVER
FIFTY YEARS

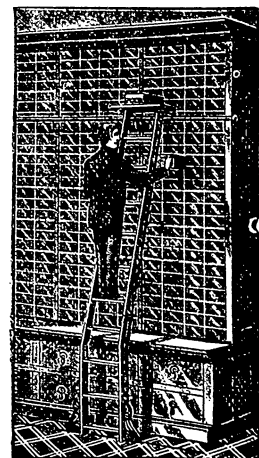


The CHAS. PARKER CO.
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This is a fac-simile of an 11x15 inch show card in gold and colors which is attractive in every hardware store. We will mail one to any hardware dealer who will place it conspicuously in his store.

THE Bicycle Step Ladder.

Especially adapted for
Hardware Stores.



THE ---

NEWEST,
NEATEST,
SIMPLEST,
EASIEST OPERATED,
and SAFEST



----- STORE LADDER MADE.

Highest Award World's Fair.

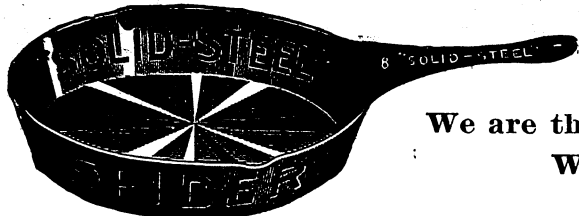
WRITE US.

The Bicycle Step Ladder Co.,

N. Y. AGENCY:
E. J. HUSSEY & CO.,
80 John St.

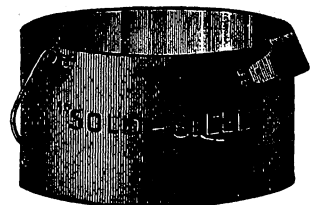
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"SOLID-STEEL" SEAMLESS HOLLOW WARE.



No Seams, no Rivets in "Solid-Steel" Ware.

We are the leaders in Steel Hollow
Ware and all Sheet
Metal Work.

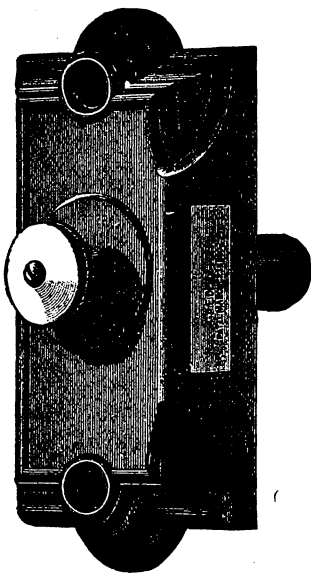


"Solid-Steel" Mangle Kettle.

The Cleveland Stamping & Tool Co., Cleveland, O.

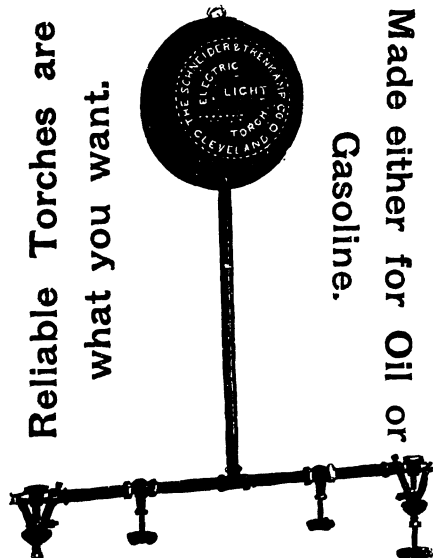
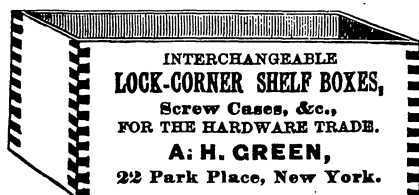
We do Light and Heavy Stamping and Blanking. Also build Dies and Stamping Machinery.

A. E. DEITZ.



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J. C. McCARTY & CO., Agents, 97 Chambers
and 81 Reade Sts., New York.
Factory, BROOKLYN, E. D., N. Y.

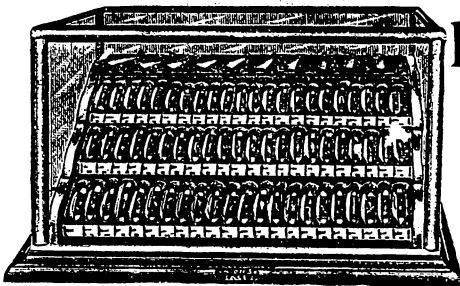


Reliable Torches are
what you want.

Made either for Oil or
Gasoline.

These Torches are particularly adapted for use in
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strong white light, are free from smoke and are not
affected by wind or rain. They are convenient and
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about one-half cent to one cent per hour, burning a
bright, steady light which is ten times greater than
the light of an ordinary gas burner.
Write us for prices. A liberal discount given to the
trade.
Manufactured by
THE SCHNEIDER & TRENKAMP CO.
Nos. 479 to 497 Case Ave., Cleveland, Ohio.

THE "DEMPSEY" PATENT CUTLERY Display Case.



Patented October 3d, 1893.

Convenient, Attractive, Clean. Saves
Time and Money. Increases Sales.
Preserves and Protects Stock.
You Can Get One Without
Cost Through Our
Agents.

UNION SHOW CASE COMPANY, Chicago, Ill.

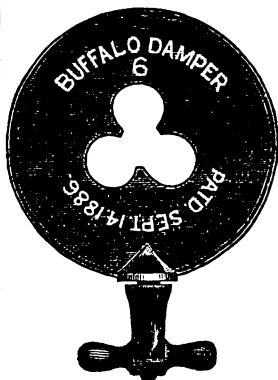
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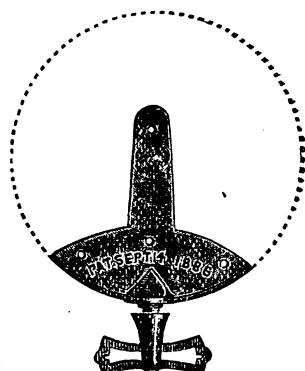
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SAVES
TIME AND TEMPER.
SIMPLE,
SINGLE BEARING,
EASILY PUT IN.
ONLY ONE HOLE IN PIPE.
NO SPRINGS.

A machine screw passes through
handle and into tongue on damper
plate, securely and easily fasten-
ing the damper into its place.



THE BUFFALO DAMPER CLIP.

The Buffalo Damper Clip Is a Success!

As is testified to by thousands of dealers who couldn't "keep house" without it. Any ODD size damper easily made.

All DAMPERS or DAMPER CLIPS supplied with enameled wood, or metal handles, as desired.

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BUFFALO, N. Y.

CHICAGO, ILL.

CHAS. W. WELLS, New England Sales Agent, 19 Pearl St., BOSTON, MASS.

SAMPLE ORDERS SOLICITED.



ALUMINUM

Ingots, Sheets, Rods, Tubes, Wire and Castings, Cooking
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Coffee Pots, Chafing Dishes, Rice Boilers, Tea Kettles, &c.

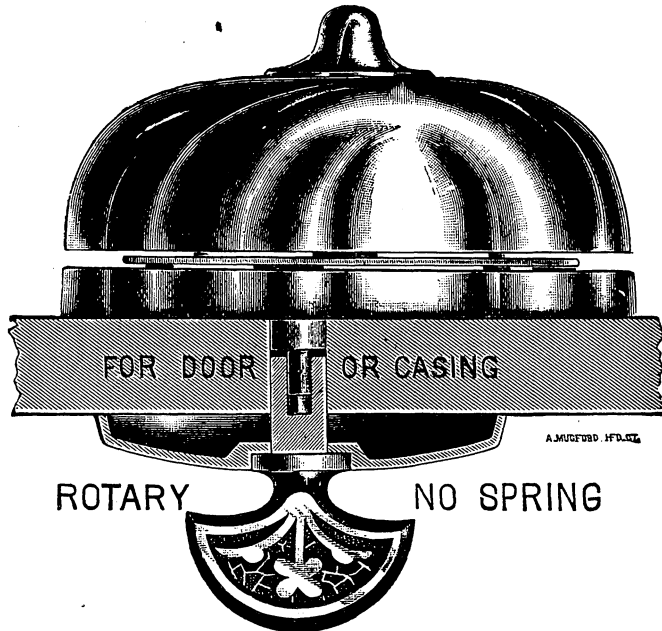
WRITE FOR THE WOHLER ALUMINUM COMPANY,
CATALOGUE. 55 Jackson Street, - Chicago, Ill.

NEW DEPARTURE "ROTARY" DOOR BELLS

ELECTRICAL RESULTS.

3 Inch.

No. 91, Nickel Plated.
No. 92, Bronze Plated.
Per Doz., \$17.50.



3 1/2 Inch.

No. 101, Nickel Plated.
No. 102, Bronze Plated.
Per Doz., \$20.00.

Simply turning the knob about one-fourth in either direction produces about ten clear, full tones, which though not startling or annoying, can be better heard all through the house than any bell ever made to imitate Electrical Results.

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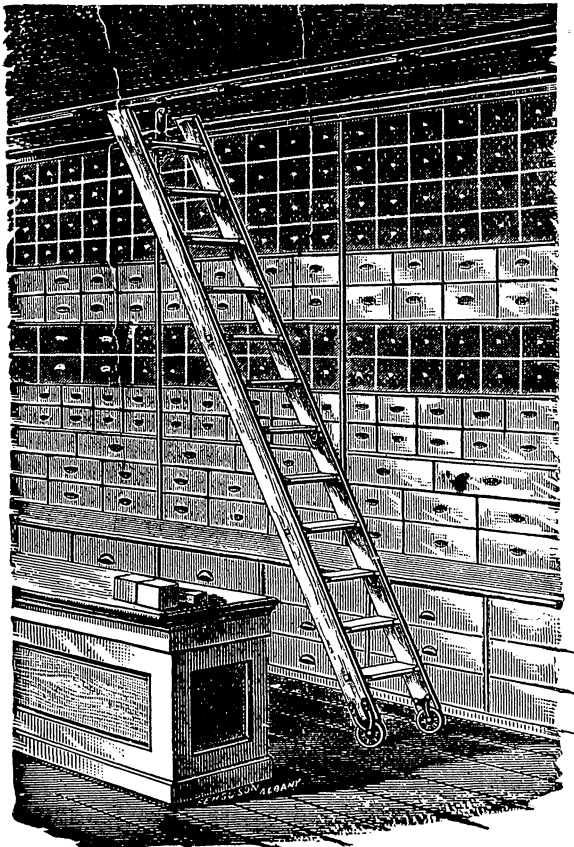
JOHN H. GRAHAM & CO.,

113 Chambers St.,

N. Y. CITY, N. Y.

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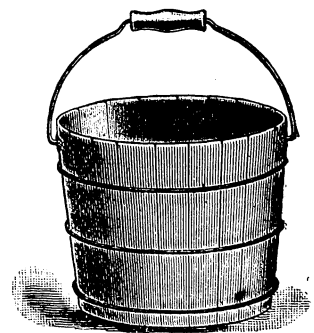
THE "NOISELESS" STORE LADDER.



The latest and best. Perfectly noiseless. Neat in appearance.

Manufactured by
M. CROISSANT,
ALBANY, N. Y.

ELECTRIC-WELDED Wire-Hoop Cedar Pail.

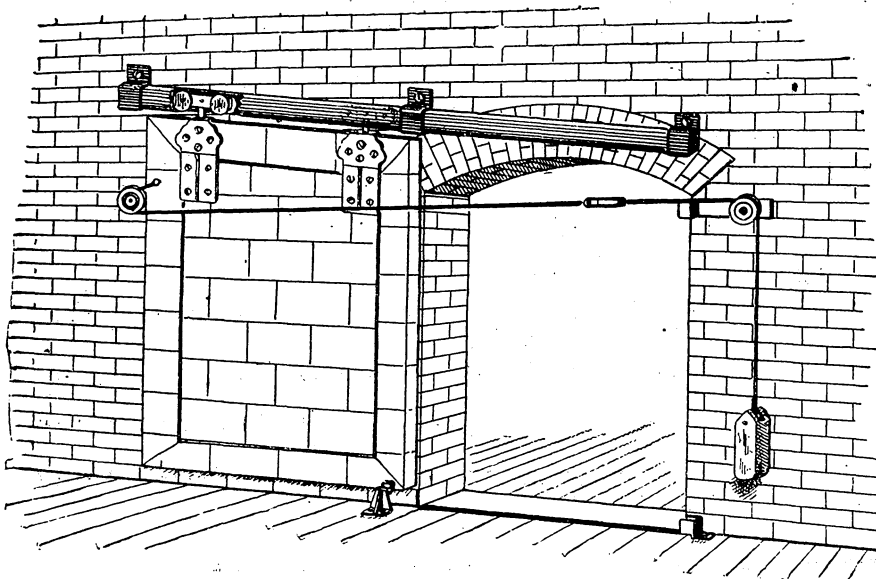


Pat. March 24th, 1891,
and April 10th, 1894.

Made of best selected Virginia White Cedar. Hoops are rust proof, are sunk in grooves, and are twice as strong as old style flat hoop. Impossible for this pail to fall down. Write for prices and catalogue.

Richmond Cedar Works,
Manufacturers of Woodenware,
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THE COBURN SELF CLOSING FIRE DOOR.



EQUIPPED WITH AUTOMATIC
FIRE DOOR FITTINGS.

The only absolutely fireproof runway in the world. This can be applied to brick walls at a less expense to builder than any other device. No woodwork to warp, wear or burn or to protect with a covering of tin. Track cannot be twisted off the wall by excessive heat, and in case of fire the door will hang as long as wall stands, the track being bolted direct to the brick walls. More easy to apply than any other fixture.

GET our CATALOGUE of
PARLOR BARN FIRE Door Hangers
—AND—

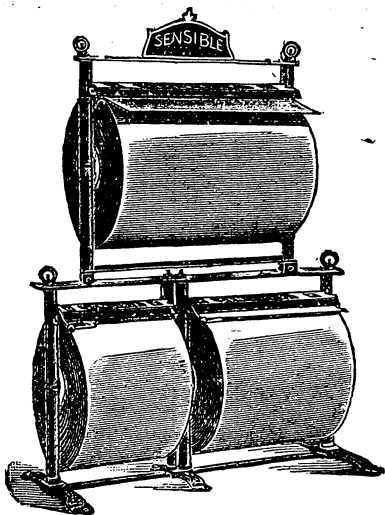
TROLLEY STORE LADDERS.

COBURN TROLLEY TRACK MFG. CO.,

HOLYOKE, MASS.

N. R. STREETER & CO.,

Manufacturers of SAD IRONS and HARDWARE.



Our Original Line of
SENSIBLE and PIONEER
Roll Paper Holders and Cutters
ARE THE BEST.

No. 1 Sensible, Nickel Plated blade and name plate. Best finish.

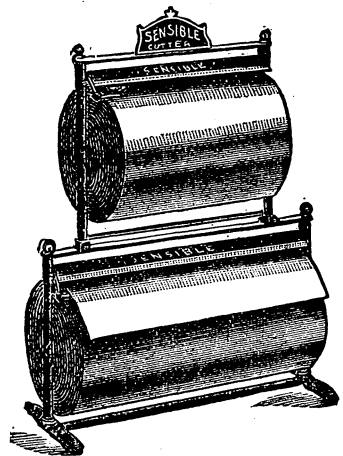
No. 2 Sensible, Japanned blade without name plate.

Pioneer, made in one style only. Best finish.

No. 1 Sensible and Pioneer, same price. Are put up in any combination desired or in pyramids three high.

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Write for our 1894 Catalogue.



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General Office, Groton, N. Y.

N. Y. Office, W. H. JACOBUS, 90 Chambers-St.

The Cleveland Wood Turning Co.,

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Special work in Handles and Wood Turning of all kinds. Our line of regular made Tool Handles is the best.



PATENT APPLIED FOR.
The Steel Stretcher Handle,
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in Hazel Wood only.
No. 110.

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IMPROVED EDITION OF THE IRON AGE HARDWARE PRICE BOOKS.

Arranged by R. R. WILLIAMS, Hardware Editor of the Iron Age.

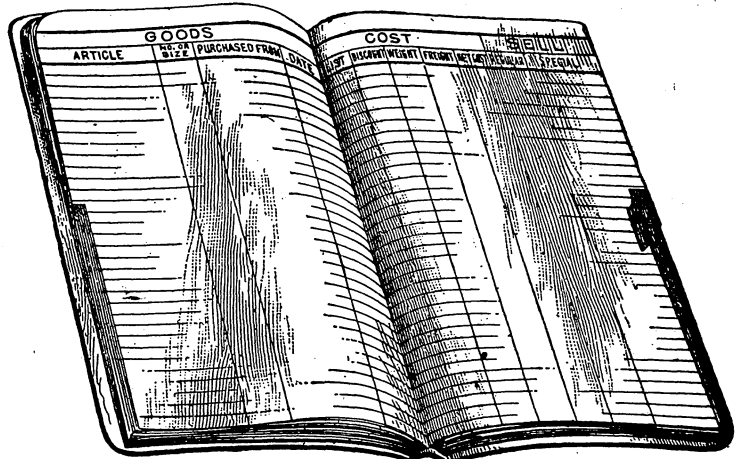
These Books are printed on paper of superior quality and bound in grain seal leather.

Columns are provided for the name and number or size, for noting from whom purchased, date of quotation or purchase, list and discount, and for entering freight expenses as an element of cost. Under the heading of selling prices, the regular and any special price, or remarks in regard to the goods are given place. This book goes into considerable detail in describing the goods and cost prices. It has been arranged in accordance with the views of many Hardwaremen whose methods are careful and exact.

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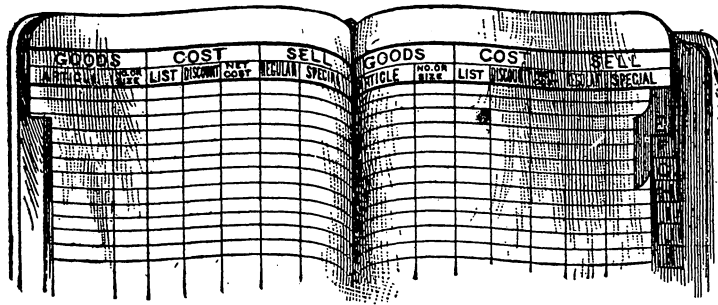
Hardware Price Book A.

In this book each page is complete, and the record of prices does not, as in Book A, run across two pages. Thus it accommodates a larger range of goods with much less detail in the record. It is adapted for office or store use, and by the use of familiar abbreviations, sufficiently large for the convenient and concise record of prices.

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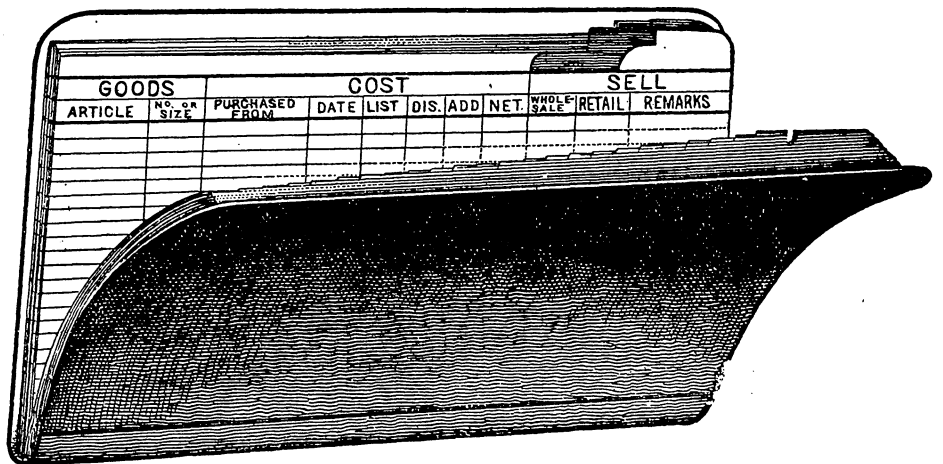
Hardware Price Book B.

The headings in Book C run across the top, in a line parallel with the hinge. In this way a very complete record can be kept on a single page. The details of weight and freight contained in Book A are omitted, and a single column headed "Add" given for the insertion of freight or other expenses which it is desirable to include in the cost. Under the selling prices space is left for the wholesale price, the retail price, and also for any remarks in regard to cost of the goods, desirability of pushing them, or other matters.

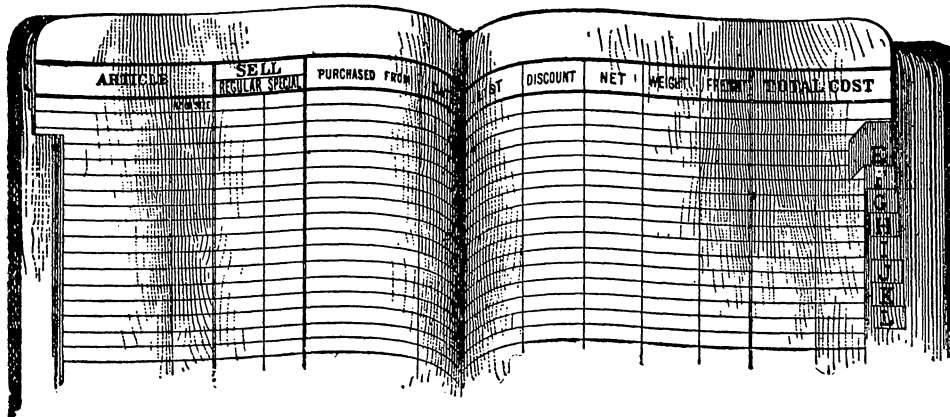
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FOUR EDITIONS.

C, 200 pages, - - -	\$1.00
C F, 200 pages with flap, - - -	1.25
C 2, 400 pages, - - -	1.50
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Hardware Price Book C.



Hardware Price Book D.

Arrangement is adapted to the requirements of the trade in this direction.

FOUR EDITIONS.	D, 200 pages, - - - - -	\$2.00	D 2, 400 pages, - - - - -	\$3.00
	D F, 200 pages, with flap, - - - - -	2.50	D F 2, 400 pages, with flap, - - - - -	3.50

Price Book D will recommend itself particularly for desk and store use, and for salesmen on the road.

The name of the article, its number or size and the selling price are the first to meet the eye on the left-hand page, as embodying information desired when the selling price is required. The other headings follow in convenient order, by which a detailed memorandum regarding the goods may be kept, the whole being seen at a glance. A number of pages at the back of the book are arranged for memoranda, which will be found a great convenience. This arrangement is adapted to the requirements of the trade in this direction.

Size 5¼ x 8 in.; grain seal leather.

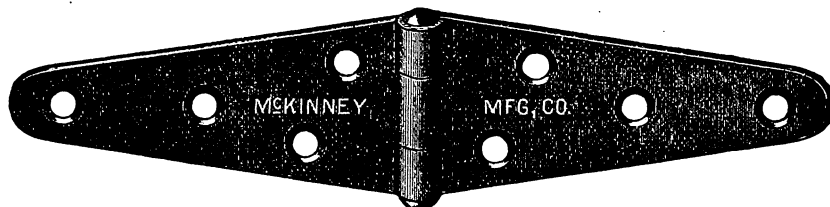
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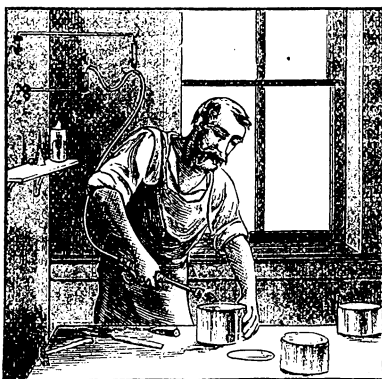
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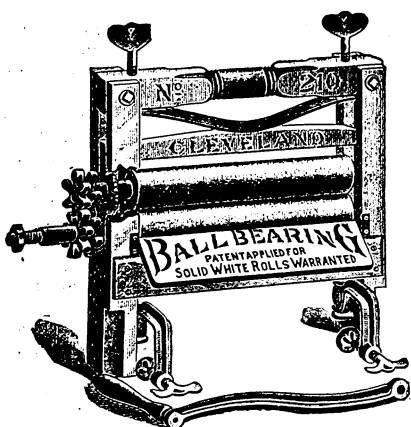
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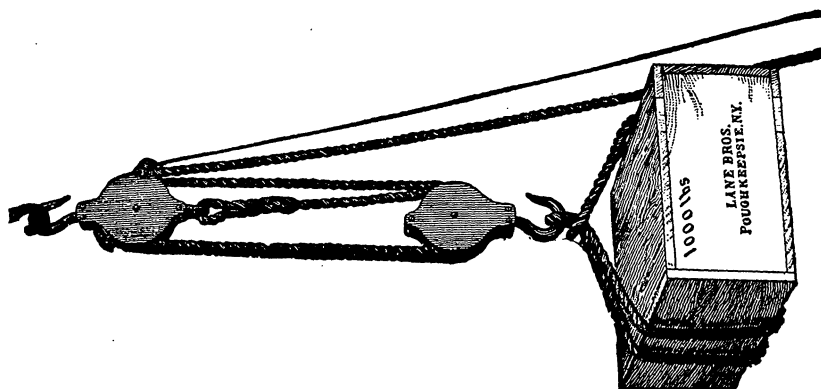
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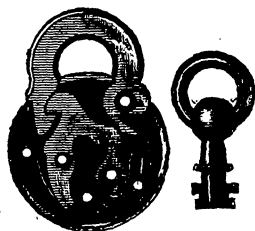
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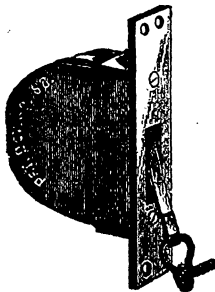
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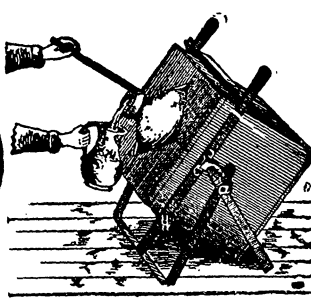
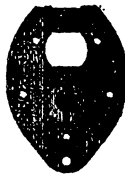
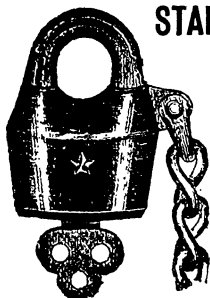
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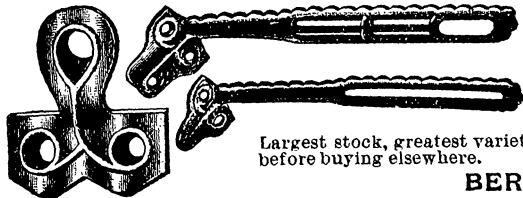
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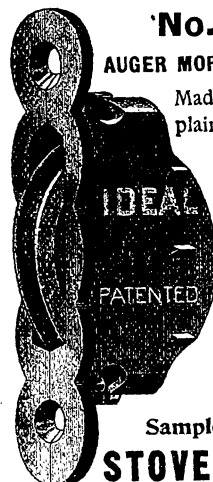
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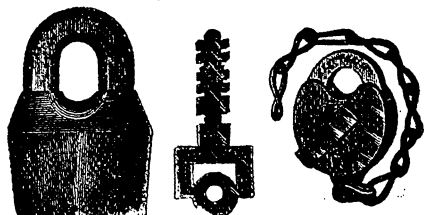
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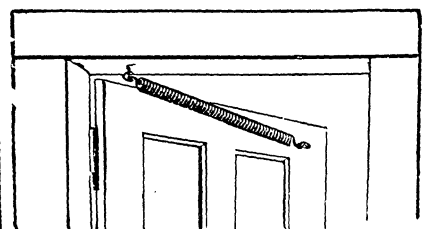
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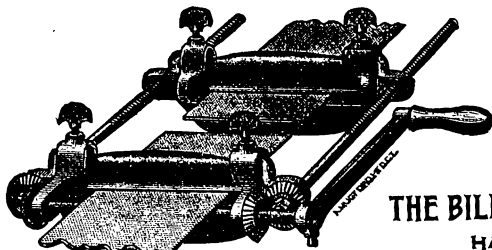
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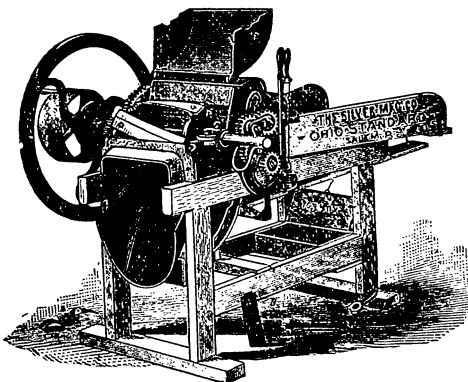
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THE "OHIO" Feed and Ensilage Cutters and Carriers are the best.

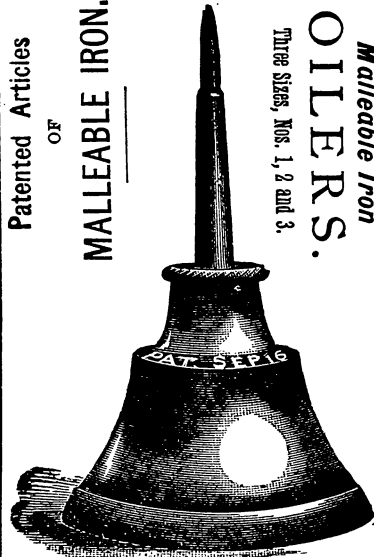
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New Pattern Heavy Screw Clamps.
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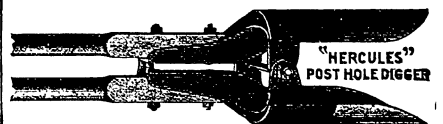
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After numerous and costly experiments have succeeded in manufacturing a special quality of soft homogeneous steel, specially adapted to the manufacture of Horse and Mule Shoes, and are now making from this steel Extra Swaged and Government Pattern Horse and Mule Shoes. They give the best of satisfaction everywhere and we furnish them to the trade at the same prices as the regular iron shoe sold by ourselves and our competitors. We are at present making our Roadster Pattern Horse Shoes out of Iron, but we will make them of Steel also within a short time.



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We would also call your attention to our improved Steel Toe Calk, equal to any in the market. To secure the best wearing qualities, use sand or borax in welding on the Calk and cool off at a dark, or still better, cool off without plunging in water.

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Soft Steel Horse Shoe Bar, All Sizes.

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The advantages of these shoes are that, being made of vastly superior material, they will never show signs of red-shortness or cold shortness, will never split in the crease and will always show a much finer finish than any iron shoe.

We make the Steel Shoes lighter than the Iron, giving more shoes to the keg, as follows :

No. 1, 15 more shoes to the keg.

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" " "

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" " "

And other sizes in proportion.

We also beg to say that we have introduced improved machinery into our new factory and have doubled our capacity, and are now prepared to furnish the best shoe, either iron or steel, ever offered to the trade.

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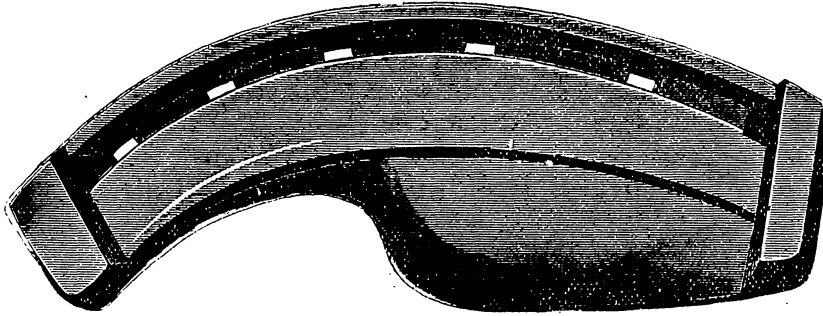
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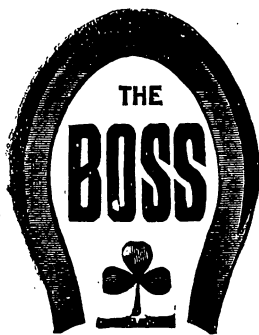
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Made under Deebie's Patent, Aug. 9, 1887.

Our 1891 pattern is a modification of the style we have made for the past four years, giving additional strength to the web.

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Superior Quality, Shape and Finish.

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Horse and Mule Shoes of the Perkins Pattern.

SPECIALTIES:—X L Steel Shoes, Toe Weight Shoes and Goodenough Shoes.

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Other "high grade" specialties in Rivets, Spikes, Splice Bars, Track and Machine Bolts, Blank Nuts, Stay Bolt Iron, Horse Shoe Iron, Bar Iron, &c.

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Elegant Iron.

Beautiful Shape.

HORSE SHOES,

Light, Medium and Heavy.

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— OFFICE —

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Gentlemen:—The official list of awards of the American Exhibitors has been handed to me to-day by the Director-General, and I am pleased to notify you officially that your exhibit received the First Award, which is a gold medal. Yours respectfully,

EDWARD SCOTT, U. S. Commissioner.

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AT PHILADELPHIA.
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Yours respectfully,
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MANUFACTURERS OF THE BEST QUALITY

CARRIAGE MAKERS' HARDWARE,

MANUFACTURE THE LARGEST VARIETY OF

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Of Best Material and Workmanship.

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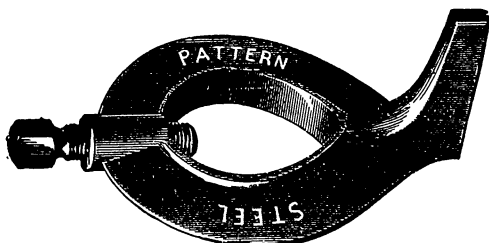
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All Sizes. All Patterns. All Warranted. Sold Everywhere.

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WITH STEEL SCREWS.



U. S. Standard.			Points Hardened.		
No.	Inch.	Price.	No.	Inch.	Price.
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Small set of 8, \$5.50. Full set of 12, \$12

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These goods are for sale by CHAS. CHURCHILL & CO., Ltd., 21 Cross St., London, England.



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THE Covert "Pants Stretcher" will restore the pantaloons to their original shape and length. It removes all **WRINKLES** and **BAGGING AT THE KNEES**, giving them the appearance of having just left the tailor's hands.

It also holds the pants in a convenient position for brushing and cleaning.

The Stretcher cannot get out of order, and can be adjusted in the pants in a few seconds.

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Successor to
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PATENT STEEL
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TOE-CALKS.
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FOOT VICE.
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Horse and Mule Shoes,
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CRESCENT HORSE SHOE
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Out One-half Size.
Sample pair sent to any hardware or saddlery firm by ad dressing

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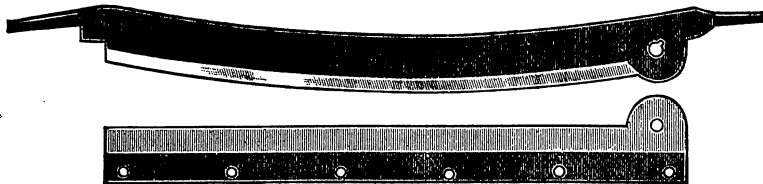
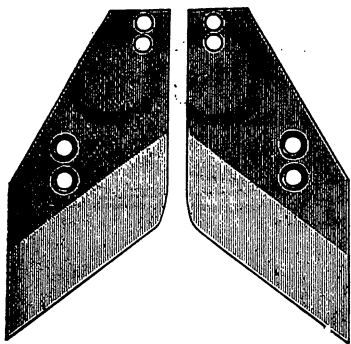
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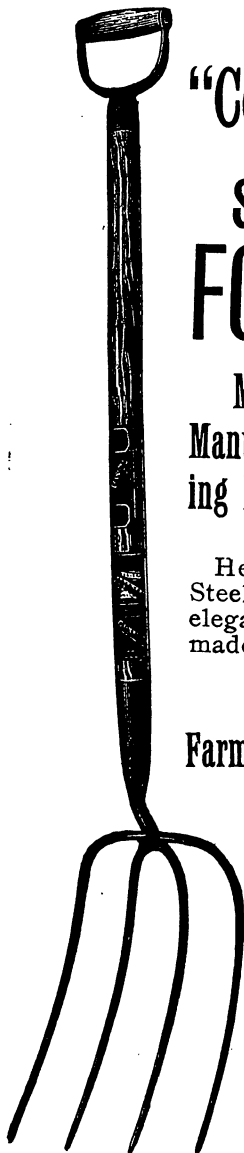
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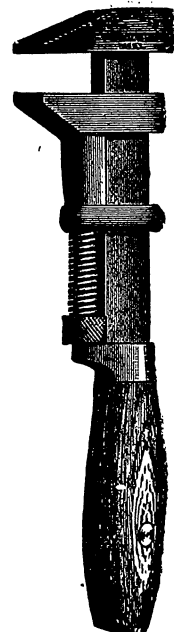
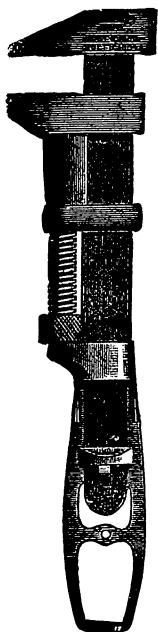


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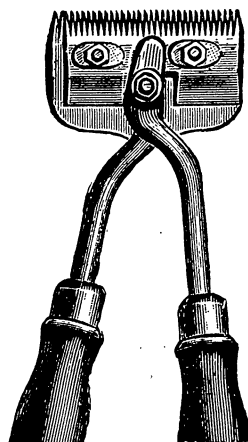
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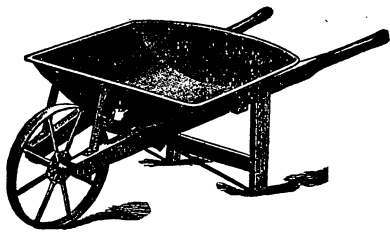
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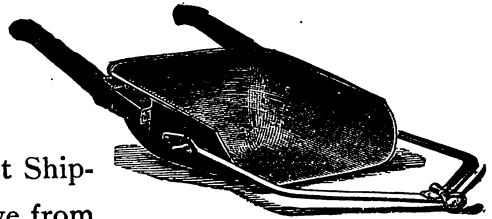
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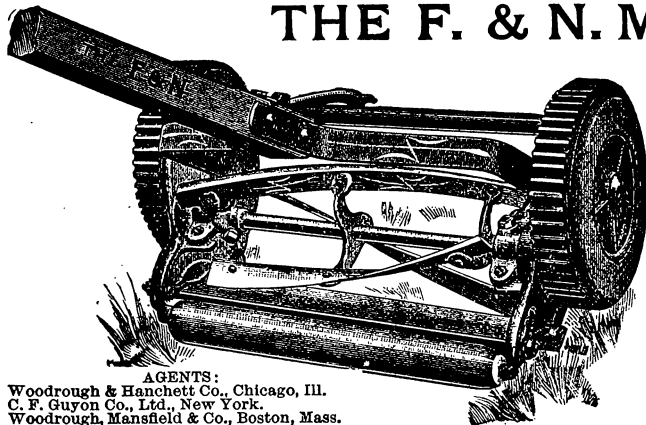
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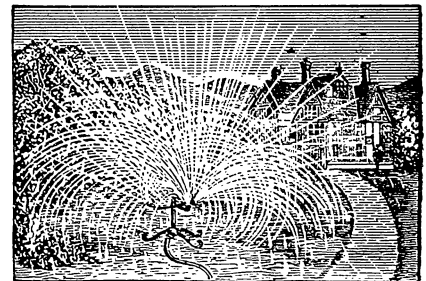


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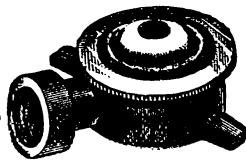
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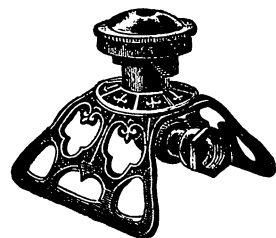
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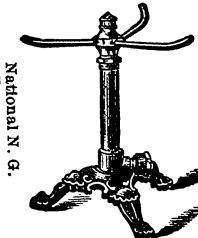
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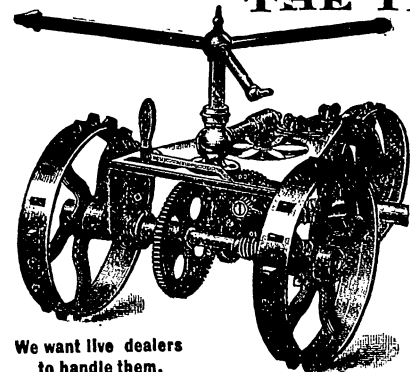
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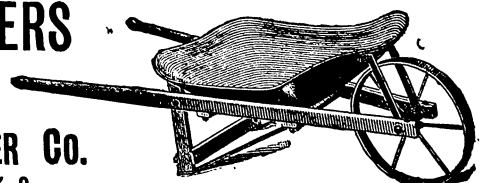
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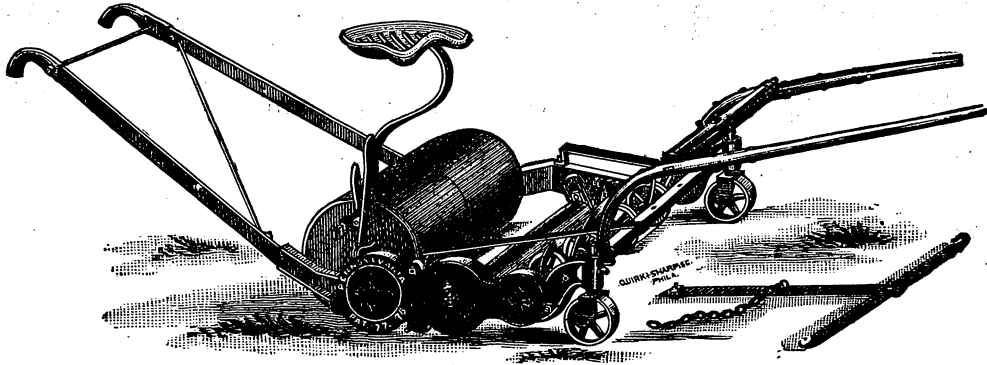


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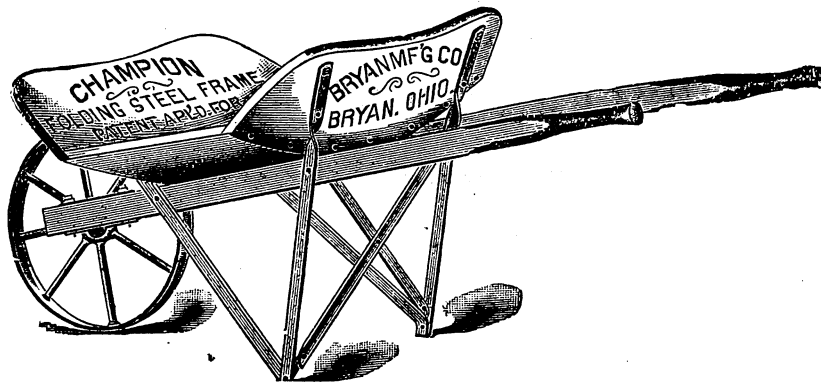
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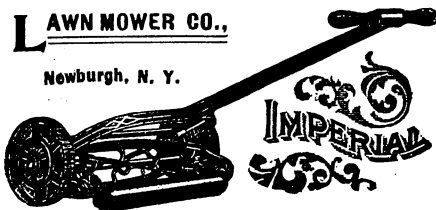
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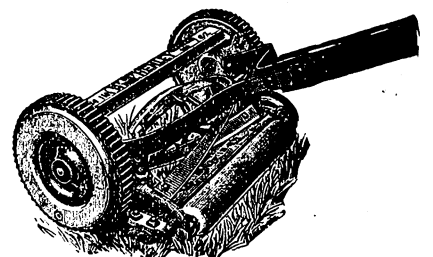
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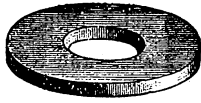
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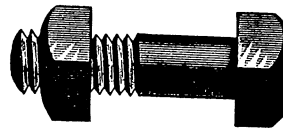
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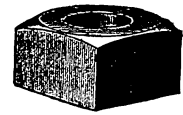
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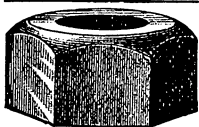
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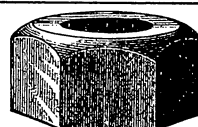
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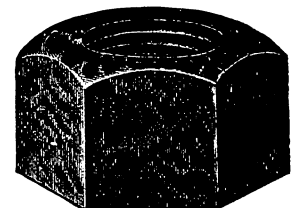
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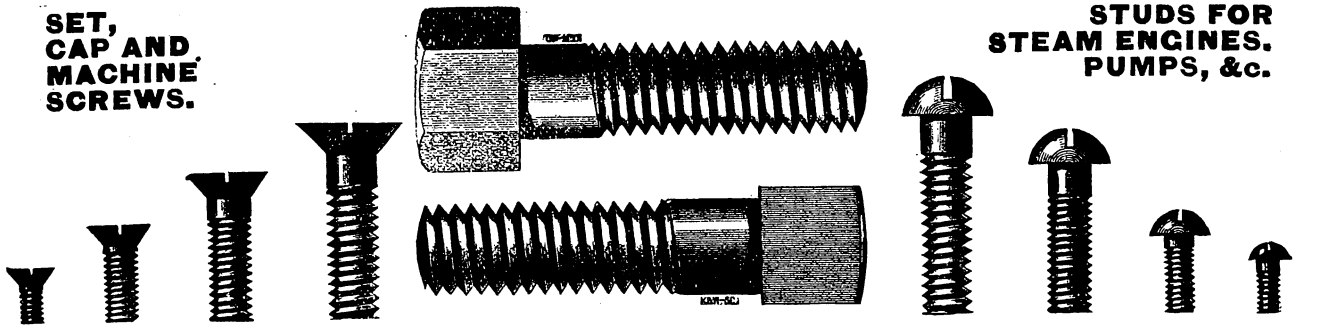
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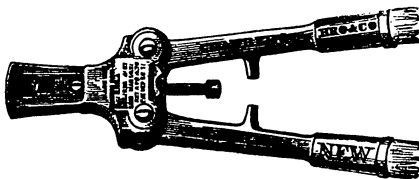


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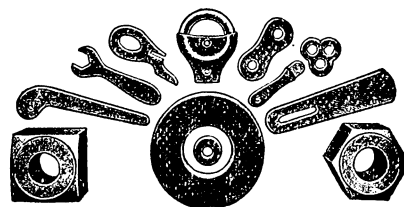
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Goodell, J. W., Burlington, Vt.

Box Straps and Corners.

De Haven Mfg. Co., Brooklyn, N. Y.

Boxes, Hdw. Shelf, &c.

Green, A. H., 22 Park Place, N. Y.
Jones, Jesse & Co., Philadelphia, Pa.

Brass, Manufacturers of.

Ansonia Brass & Copper Co., N. Y.
Davi, John & Sons, 100 John, N. Y.
Plume & Atwood Mfg. Co., N. Y.
Randolph & Clowes, Waterbury, Conn.
Rome Brass & Copper Co., Rome, N. Y.
Scovill Mfg. Co., Waterbury, Conn.
Waterbury Brass Co., 296 B'way, N. Y.

Brass Butt Hinges.

Tiebout, W. & J., 16 & 18 Chambers.

Brass Founders.

Cramp, Wm. & Sons S. & E. B. Co.,
Philadelphia, Pa.
Eynons-Evans Mfg. Co., Philadelphia,
Pa.
Fram, E. T., Lancaster, Pa.
Haight & Clark, Albany, N. Y.
Keys, W. W. & R. M. Co., Bridgeport,
Conn.
North Bros. Mfg. Co., Phila., Pa.
Reeves, Paul S., Philadelphia.

Brass Goods.

Brass Goods Mfg. Co., 88 Chambers.

Bread and Cake Knives.

Cincinnati Mfg. Co., Cincinnati, O.
Clausen Shear Co., Fremont, O.

Bronze (Tobin).

Ansonia Bronze & Copper Co., 19-21
Cliff Street, N. Y.

Brooms and Brushes.

Rice Mfg. Co., New Durham, N. H.

Builders' Hardware.

Deltz, A. E., 97 Chambers St., N. Y.
Reading Hdw. Co., Reading, Pa.
Yale & Towne Mfg. Co., Stamford, Ct.

Burr Wheels.

Torrance Iron Co., Troy, N. Y.

Butchers' Steels.

Chatillon, John & Sons, 85-89 Cliff St.,
N. Y.

Butcher and Shoe Knives, Manufacturers of.

Chatillon, John & Sons, 85-89 Cliff St.
N. Y.
Goodell Co., Antrim, N. H.
Wilson, John, Sheffield, England.

Butts and Hinges.

McKinney Mfg. Co., Allegheny, Pa.
Mann, Jas. & Sons, Buffalo, N. Y.
Sabin Machine Co., Montpelier, Vt.
Stanley Works, New Britain, Conn.
Tiebout, W. & J., 16 Chambers, N. Y.
Wrightsville Hdw. Co., Wrightsville,
Pa.

Calipers and Dividers.

J. Stevens Arms and Tool Co., Chicopee Falls, Mass.
Starrett, L. S., Athol, Mass.

Car Axles.

Roberts, A. & P. & Co., Phila.

Carboy Stands.

Wolf, W. & L., Philadelphia, Pa.

Carriage Hardware, Makers of.

Clapp, E. D. Mfg. Co., Auburn, N. Y.
Covert's Saddlery Works, Farmer, N. Y.
Eccles, Richard, Auburn, N. Y.
Scranton Forging Co., Scranton, Pa.
Smith, H. D. & Co., Plantsville, Conn.

Cartridge Reloading Tools.

Ideal Mfg. Co., New Haven, Conn.

Carvers' Tools.

White, Van Glahn & Co., 15-17 Chat-
ham Square, N. Y.

Casters, Wheel, &c.

Clark G. P., Windsor Locks, Conn.

Castings, Iron and Steel.

Allentown Hdw. Wks., Allentown, Pa.
Booth, The Lloyd Co., Youngstown, O.
Boston Casting Co., So. Boston, Mass.
The Burr & Houston Co., Brooklyn,
N. Y.
Cheney, S. & Son., Manlius, N. Y.
Chester Steel Casting Co., Phila.
Chrome Steel Works, Brooklyn, N. Y.
Eureka Cast Steel Co., Chester, Pa.
Flagg, Stanley G. & Co., Phila.
Garland Foundry Co., Cleveland, O.
Haight & Clark, Albany, N. Y.
King & Andrews Co., Chicago, Ill.
Palmer & De Mooy Fdry. Co., Cleve-
land, O.
Pratt & Cady Co., Hartford, Conn.
Sessions Foundry Co., Bristol, Conn.
Spencer's I. S. Sons, Guilford, Conn.
Standard Fdy. & Mfg. Co., Cleveland, O.
Torrance Iron Co., Troy, N. Y.
Walker Mfg. Co., Cleveland, Ohio.
Wetherill, Robert & Co., Chester, Pa.

Castings, Malleable.

Arcade Malleable Iron Co., Worcester,
Mass.
Hamm & Co., Branford, Conn.
Torrance Iron Co., Troy, N. Y.

Catalogue Files.

Folding Paper Box Co., So. Bend, Ind.

Chains.

Bradlee & Co., Philadelphia.
Garland Chain Co., Rankin, Pa.
Link Belt Engineering Co., Phila., Pa.
McKay, Jas. & Co., Pittsburgh, Pa.

Chimneys.

Phila. Engineering Works, Phila., Pa.

Chisels, Manufacturers of.

Buck Bros., Milbury, Mass.
Buck, Chas., Milbury, Mass.
White, L. & I. J. Co., Buffalo, N. Y.

Chucks.

Cushman Chuck Co., Hartford, Conn.
Hogson & Pettis Mfg. Co., New Haven,
Conn.
Skinner Chuck Co., New Britain, Conn.
Smith & Edge Mfg. Co., Bridgeport.
Union Mfg. Co., 103 Chambers, N. Y.
Whitlock, Wm., 39 Cortlandt St., N. Y.
Whitton, D. E. Mach. Co., New London,
Conn.

Clamps.

Hammer & Co., Branford, Conn.
Le Count, C. W., So. Norwalk, Conn.

Coal.

Barns, C. K. & Co., Philadelphia, Pa.
Wister, Francis, Philadelphia, Pa.

Coffee Mills.

Enterprise Mfg. Co., Phila., Pa.
Parker, Chas. Co., Meriden, Conn.

Coke.

Barns, C. K. & Co., Philadelphia, Pa.
Houston, C. B. & Co., Philadelphia, Pa.
Rukey, W. J., Cleveland, O.
Wister, Francis, Philadelphia, Pa.

Collections.

Hardware Board of Trade (Limited),
4 and 6 Warren, N. Y.

Condensers.

Worthington, Henry R., 86 & 88 Liberty
Street, N. Y.

Conveying Machinery.

Brown Hoisting & Conveying Machine
Co., Cleveland, Ohio.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Engineering Co., Phila., Pa.

Copper.

Ames Sword Co., Chicopee, Mass.
Ansonia Brass & Copper Co., 19 and 21
Cliff, N. Y.
Hendricks Bros., 49 Cliff, N. Y.
New Haven Copper Co., 294 Pearl, N. Y.
Randolph & Clowes, Waterbury, Conn.
Rome Brass & Copper Co., Rome, N. Y.
Wister, Francis, Philadelphia, Pa.

Cordage.

Samson Cordage Works, Boston, Mass.

Cork Screws.

Williamson, C. T. Wire Novelty Co.,
Newark, N. J.

Corrugated Furnaces.

Continental Iron Wks., Brooklyn, N. Y.

Corrugated Iron.

Cincinnati Corrugating Co., Piqua, O.
Cambridge Roofing Co., Cambridge.
Jersey City Galvanizing Co., 112 John
St., N. Y.
Moseley Iron Bridge & Roof Co., 5 Dey,
N. Y.
N. Y. Iron Roofing & Corrugating Co.,
Jersey City, N. J.

Counting Machines.

Durant, W. N., Milwaukee, Wis.

Cranes.

Halsey, W. S. & Co., Birdsboro, Pa.
Maris & Beckley, Philadelphia, Pa.
Ridgway, Craig & Sons, Coatesville,
Pa.
Sellers, Wm. & Co., Inc., Phila., Pa.
Whiting Foundry Equipment Co., Chi-
cago, Ill.
Yale & Towne Mfg. Co., Stamford,
Conn.

Cupolas, Hot Blast.

Whiting Foundry Equipment Co., Chi-
cago, Ill.

Cutlery, Importers of.

Sickles, Sweet & Lyon, 35 Barclay, N. Y.

Cutlery, Manufacturers of.

Bingham, W. Co., Cleveland, Ohio.
Dame, Stoddard & Kendall, Boston,
Mass.
Goodell Co., Antrim, N. H.
Northampton Cutlery Co., Northamp-
ton, Mass.
Pauls Bros., 38 Chambers St., N. Y.
Wilson, John, Sheffield, England.

Cutlery Display Cases.

Union Show Case Co., Chicago, Ill.

Cyclometers.

Bridgeport Gun Implement Co., 313-
315 Broadway, N. Y.

Dampers.

Arcade Mfg. Co., Freeport, Ill.
Shepard, Sidney & Co., Buffalo, N. Y.

Dies.

Wilson, J. Fred, Worcester, Mass.

Die Forgings and Castings.

Bliss, E. W. Co., Brooklyn, N. Y.

Door Checks and Springs.

Bardsley, J., 149 & 151 Baxter St., N. Y.

Door Knobs.

Perry & Whipple Co., New Haven, Ct.

Door Springs.

Colled Wire Belting Co., Jersey City,
N. J.

Drilling Machines.

Bickford Drill & Tool Co., Cin., Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Champion Blower & Forge Co., Lan-
caster, Pa.
Colburn, A. M., New Haven, Conn.
Dallett, Thos. H. & Co., Philadelphia.
D'Amour & Littleale 204 E. 43d St., N. Y.
Dietz, Schumacher & Co., Cincinnati,
Ohio.
Dwight Slate Machine Co., Hartford,
Conn.
Goddard, Asa, Worcester, Mass.
Halsey, Jas. T., Philadelphia, Pa.
Hamilton Mch. Tool Co., Hamilton, O.
Fenna, Diamond Drill & Mfg. Co.,
Birdsboro, Pa.
Quint, A. D., Hartford, Conn.
Sellers, Wm. & Co., Inc., Phila., Pa.
Sigourney Tool Co., Hartford, Conn.
Silver Mfg. Co., Salem, O.
Wiley & Russell Mfg. Co., Greenfield,
Mass.

Drop Forgings.

Billings & Spencer Co., Hartford, Conn.
Boone, W. C. Mfg. Co., Bounton, N. J.
Clapp, E. D. Mfg. Co., Auburn, N. Y.
Eccles, Richard, Auburn, N. Y.
Merrill Bros., Brooklyn, E. D.
Miner & Peck Mfg. Co., New Haven, Ct.
Phila. Drop Forge Co., Phila., Pa.
Scranton Forging Co., Scranton, Pa.
Wilcox & Howe Co., Birmingham,
Conn.
Wilnot & Hobbs Mfg. Co., Bridgeport,
Conn.
Wyman & Gordon, Worcester, Mass.

Drop Presses.

Bliss, E. W. Co., Brooklyn, N. Y.
Crosby, G. A. & Co., Chicago, Ill.
Miner & Peck Mfg. Co., New Haven,
Conn.
Stiles & Parker Press Co., Brooklyn,
N. Y.
Vulcan Iron Works, Chicago, Ill.
Waterbury Farrel Foundry and Ma-
chine Co., Waterbury, Conn.

Dumb Waiters.

Hutchinson, F. S. Co., 32 Warren Street,
N. Y.
Storm Mfg. Co., Newark, N. J.

Dynamite.

New York Powder Co., 62 Liberty St.,
N. Y.

Dynamos.

C. & C. Electric Co., 402 and 404
Greenwich St., N. Y.
Colburn Electric Mfg. Co., Fitchburg,
Mass.

Edge Tools, Makers of.

Buck Bros., Millbury, Mass.
Buck, Chas., Millbury, Mass.
Plumb, Layette R., Philadelphia, Pa.
White, L. & I. J. Co., Buffalo, N. Y.

Egg Beaters.

North Bros. Mfg. Co., Philadelphia, Pa.

Electric Bells and Supplies.Ostrander, W. R. & Co., 204 Fulton St., New York.
Wollensak, J. F., Chicago, Ill.**Elevators, Makers of.**Link-Belt Engineering Co., Phila., Pa.
Morris, Williams & Co., Phila., Pa.
Penn. Elevator Engineering Co., Phila., Pa.**Emery and Emery Wheels.**Diamond Mach. Co., Providence, R. I.
N. Y. Belting & Packing Co., Ltd., N. Y.
Northampton Emery Wheel Co., Leeds, Mass.
Norton Emery Wheel Co., Worcester, Mass.
Sterling Emery Wheel Co., 174 Fulton St., N. Y.
Tanite Co., Stroudsburg, Pa.**Emery Wheel Dressers.**

Bay State Stamping Co., Worcester, Mass.

Engineers and Contractors.Aiken, Henry, Pittsburgh, Pa.
Herrick, J. A., 284 Pearl St., N. Y.
Kennedy, Julian, Pittsburgh, Pa.
Laughlin, Alex. & Co., Pittsburgh, Pa.
Lean, D. B. Co., Pittsburgh, Pa.
McClure, Amsler & Co., Pittsburgh, Pa.
Pittsburgh Iron & Steel Engineering Co., Pittsburgh, Pa.
Smythe, S. R. Co., Incorporated, Pittsburgh, Pa.
Swindell, W. & Bros., Pittsburgh, Pa.**Engines, Gas and Gasoline.**Buckeye Mfg. Co., Union City, Ind.
Otto Gas Engine Works, Phila., Pa.
Springfield Gas Engine Co., Springfield, Ohio.**Engines, Steam, Makers of.**Bass Foundry & Machine Works, Ft. Wayne, Ind.
Harris, Wm. A., Steam Engine Co., Providence, R. I.
Norwalk Iron Works Co., So. Norwalk, Conn.
Penna. Diamond Drill & Mfg. Co., Birdsboro, Pa.
Phila. Engineering Works, Phila., Pa.
Southwalk Foundry & Machine Co., Phila., Pa.
Tod, William & Co., Youngstown, O.
Totten & Hogg Iron & Steel Fdry. Co., Pittsburgh, Pa.
Wetherill, Robt. & Co., Chester, Pa.**Exhaust Tumblers.**

Sweetser, W. A., Brockton, Mass.

Expansion Bolts.Boone, W. C. Mfg. Co., Boonton, N. J.
Church, Isaac, Toledo, O.
Steward & Romaine Mfg. Co., Phila., Pa.**Exporters.**

Flint & Co., 68 Broad St., N. Y.

Faucets, Self-Measuring.

Lane Bros., Poughkeepsie, N. Y.

Faucets, Wooden, Makers of.

John Sommer's Son, Newark, N. J.

Feed-Water Heaters and Purifiers.Davis, I. B. & Son, Hartford, Conn.
Harrison Safety Boiler Works, Phila., Pa.
National Pipe Bending Co., New Haven, Conn.
Taunton Locomotive Mfg. Co., Taunton, Mass.
Webster, Warren & Co., Camden, N. J.
Whitlock Coil Pipe Co., Elmwood, Conn.**Fencing, Iron and Wire.**Barnum, E. T., Detroit, Mich.
Champion Iron Co., Kenton, O.
Chess Bros., Pittsburgh, Pa.
Clinton Wire Cloth Co., Clinton, Mass.
Gilbert & Bennett Mfg. Co., 42 Cliff St., New York.
Kilmer Mfg. Co., Newburgh, N. Y.
Randall Fence Co., Le Roy, N. Y.
The Van Dorn Iron Works Co., Cleveland, O.**Files, Importers of.**

Moss, F. W., 80 John St., N. Y.

Files and Rasps, Manufacturers of.Arcade File Works, Anderson, Ind.
Banker & White, Troy, N. Y.
Barnett, G. & H., 41 & 43 Richmond, Phila.
McCauley File Co., Philadelphia.
Nicholson File Co., Providence, R. I.**Fire Brick, Makers of.**Borgner, Cyrus, Philadelphia, Pa.
Gardner, Jas. & Son, Cumberland, Md.
Kreischer, B. & Sons Foot E. Houston St., N. Y.
Maurer, H. & Son, 420 E. 23d, N. Y.
Ostrander Fire Brick Co., Troy, N. Y.
Valentine, M. D. & Bro. Co., Woodbridge.**Fire Doors.**

Coburn Trolley Track Mfg. Co., Holyoke, Mass.

Fishing Tackle.

Dame, Stoddard & Kendall, Boston, Mass.

Flint and Emery Paper.

Baeder, Adamson & Co., Phila., Pa.

Flour Sifters.

Bromwell Brush & Wire Goods Co., Cincinnati, Ohio.

Fodder Cutters.

Silver Mfg. Co., Salem, O.

Forges, Portable, &c.Buffalo Forge Co., Buffalo, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
Sturtevant, B. F. Co., Boston, Mass.**Forgings, Iron and Steel.**Bethlehem Iron Co., S. Bethlehem, Pa.
Cambria Steel-Cambria Iron Co., Johnstown, Pa.
Frankford Steel Co., Phila., Pa.
Scranton Forging Co., Scranton, Pa.
U. S. Projectile Co., Brooklyn, N. Y.**Forks, Hay and Manure.**

Iowa Farming Tool Co., Ft. Madison Iowa.

Foundry Facings.Dixon, Jos., Crucible Co., Jersey City, N. J.
S. Obermayer Co., Cincinnati, O.
Smith, J. D. Fdy. Supply Co., Cin., O.
Smith's Pattern Works, Akron, Ohio.**Foundry Riddles.**

Estey, W. S., 65 Fulton, N. Y.

Foundry Supplies.Diamond Clamp & Flask Co., Richmond, Ind.
S. Obermayer Co., Cincinnati, O.
Rice Mfg. Co., New Durham, N. H.
Smith, J. D., Fdy. Supply Co., Cin., O.
Smith's Pattern Works, Akron, Ohio.**Friction Clutches.**Brown, A. & F., 17 Dey St., N. Y.
Keystone Clutch & Mch. Wks., Phila., Pa.
Moore & White Co., Philadelphia, Pa.**Friction Cone.**

Evans Friction Cone Co., Boston, Mass.

Galvanized Material.

Jersey City Galvanizing Co., 112 John St., N. Y.

Galvanizing Kettles.

Sands, Thos., Nashua, N. H.

Gas Producers.

Wood, R. D. & Co., Philadelphia, Pa.

Gas & Steam Fitters' Supplies.

Pancoast, Henry B. & Co., Phila., Pa.

Gate Hinges.

Wrightsville Hdw. Co., Wrightsville, Pa.

Gear Cutters.

D. E. Whiton Mach. Co., New London, Conn.

Gears.Boston Gear Works, Boston, Mass.
Gleason Tool Co., Rochester, N. Y.
Lincoln Iron Works, Rutland, Vt.
Poole, Robt. & Son Co., Baltimore, Md.
U. S. Projectile Co., Brooklyn, N. Y.**Glass Cutters.**

Monce, S. G., Bristol, Conn.

Glue.Baeder, Adamson & Co., Phila., Pa.
Dodd, A. W. & Co., Gloucester, Mass.
Russia Cement Co., Gloucester, Mass.**Grass Catchers.**

Supplie Hardware Co., Phila., Pa.

Grate Guards.

Dow Wire Works Co., Louisville, Ky.

Grinding and Polishing Machines.

Diamond Mach. Co., Providence, R. I.

Grindstone Dressing Machinery.

Blake & Johnson, Waterbury, Conn.

Grindstones.

Cleveland Stove Co., Cleveland, O.

Gunpowder, Makers of.

Laffin & Rand Powder Co., 29 Murray St., N. Y.

Handles.

Cleveland Wood Turning Co., Cleveland, O.

Hangers, Door.Coburn Trolley Track Mfg. Co., Holyoke, Mass.
Lane Bros., Poughkeepsie, N. Y.**Hardware Comm'n Merchants.**Graham, John H. & Co., 111 Chambers St., New York.
Jacobus, W. H., 90 Chambers, N. Y.**Hardware Jobbers.**

White, Van Glahn & Co., 15-17 Chatham Square, N. Y.

Hardware Manufacturers.Stearns, E. C. & Co., Syracuse, N. Y.
Streeter, N. R. & Co., Groton, N. Y.
Union Mfg. Co., 108 Chambers, N. Y.
Yale & Towne Mfg. Co., Stamford Conn.**Hardware Mfrs. Agents.**Bingham, W. Co., Cleveland, O.
Clarke, Thomas St. John, N. B.
Graham, John H. & Co., 113 Chambers
Sickles, Sweet & Lyon, 35 Barclay, N. Y.**Hardware Specialties.**Acme Shear Co., Bridgeport, Conn.
Burger Bros., Philadelphia, Pa.
Enterprise Mfg. Co., Philadelphia, Pa.
Ette & Henger Mfg. Co., St. Louis, Mo.
Johnson, S. C., Racine, Wis.
New Britain Hdw. Mfg. Co., New Britain, Conn.
North Bros. Mfg. Co., Philadelphia, Pa.
Ransom Hdw. Co., Burlington, Vt.
Scranton & Co., New Haven, Conn.
Shepard, Sidney & Co., Buffalo, N. Y.
Wilson, J. Fred., Worcester, Mass.
Wrightsville Hdw. Co., Wrightsville, Pa.**Harness Snaps.**Covert Mfg. Co., West Troy, N. Y.
Covert Saddlery Wks., Farmer, N. Y.
Fitch, W. & E. T., New Haven, Conn.**Hoisting Machines.**Box, Alfred & Co., 314 Green, Phila.
Brown Hoisting & Conveying Mch. Co., Cleveland, Ohio.
Byers, Jno. F. Mch. Co., Ravenna, O.
Fulton Iron & Engine Wks., Detroit, Mich.
Harrington, E. Son & Co., Phila.
Lane Bros., Poughkeepsie, N. Y.
Lidgerwood Mfg. Co., 96 Liberty, N. Y.
Lincoln Iron Works, Rutland, Vt.
McCoy, Jos. F. & Co., 28 Warren St.
Maris & Beekley, Philadelphia.
Moore, Mfg. & Fdy. Co., Milwaukee, Wis.
Morse, Williams & Co., Phila.
Sellers, Wm. & Co., Phila. and N. Y.
Spiedel, J. G., Reading, Pa.
Yale & Towne Mfg. Co., Stamford, Ct.**Hollow Ware.**Avery Stamping Co., Cleveland, O.
Barnum Supply Co., Cleveland, Ohio.
Cleveland Stamping & Tool Co., Cleveland, O.**Hollow Ware, Aluminum.**

Wohler Aluminum Co., Chicago, Ill.

Horse Nails, Makers of.Capewell Horse Nail Co., Hartford, Conn.
National Horse Nail Co., Vergennes, Vt.
Putnam Nail Co., Neponset, Boston, Mass.**Horse and Mule Shoes, Makers of.**Bryden Horse Shoe Co., Catsasauqua, Pa.
Burden Iron Co., Troy, N. Y.
Crescent Horse Shoe & Iron Co., Max Meadows, Va.
Diamond State Iron Co., Wilmington, Del.
Leonard, J., 446 West St., N. Y.
Old Dominion Iron & Nail Works Co., Richmond, Va.
Pineix Horse Shoe Co., Poughkeepsie, N. Y.
Rhode Island Perkins Horse Shoe Co., Providence.
Shoenberger & Co., Pittsburgh, Pa.
Standard Horse Shoe Co., Boston, Mass.**Hose Menders.**

Hudson, C. E. & Co., Leominster, Mass.

Hose.

N. Y. Belting & Packing Co., Ltd., 15 Park Row, N. Y.

Hydrants, &c.

McLean, John, 296 & 298 Monroe, N. Y.

Hydraulic Forging.

U. S. Projectile Co., Brooklyn, N. Y.

Hydraulic Jacks.Dudgeon, Richard, 24 Columbia, N. Y.
McCoy, Jos. F. Co., 28 Warren St., N. Y.**Ice Cream Freezers.**

White Mountain Freezer Co., Nashua, N. H.

Injectors.Eynon-Evans Mfg. Co., Philadelphia, Pa.
Jenkins Bros., New York.**Insurance, Boiler.**

Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

Iron and Steel, Swedish.Lundberg, Gustaf, Boston, Mass.
Milne, A. & Co., 1 Broadway, N. Y.**Iron Commission Brokers.**Butze, Adolph, St. Louis, Mo.
Corning, Edw. & Co., 29 B'way, N. Y.
Cotton, Barclay W. & Co., Phila.
Etting, Edw. J., Philadelphia.
Hogan, John L. & Co., Philadelphia, Pa.
Hoffman, J. W. & Co., Philadelphia.
Levis, Henry & Co., Philadelphia.
Keeley, Jerome & Co., Philadelphia.
Lea, J. Tattall & Co., Philadelphia.
McFar, J. J., 430 N. 3d, Philadelphia.
Pilling & Crane, Philadelphia, Pa.
Wister, L. & R. & Co., Phila., Pa.**Iron Ore.**

Samuel, Frank, Philadelphia, Pa.

Iron, Merchants.Barns, C. K. & Co., Philadelphia, Pa.
Borden & Lovell, 70 West, N. Y.
Busenius & Cunliffe, Philadelphia.
Corning, Edw. & Co., 29 B'way, N. Y.
Cox, Justice, Jr., Philadelphia.
Cotton, Barclay W. & Co., Phila.
Hoffman, J. W. & Co., Philadelphia.
Leonard, J., 446 West St., N. Y.
Nichols, Wheeler & Co., Philadelphia.
Ogden & Wallace, 577 to 583 Green-Wich St., N. Y.
Pierson & Co., 29 Broadway, N. Y.
Thomson, W. H. & Co., Phila., Pa.
Wallace, Wm. H. & Co., 68 B'way, N. Y.
Whitney, A. R. & Co., 17 B'way, N. Y.
Wilson, E. H. & Co., Philadelphia.**Iron, Importers.**Abbott, Wheelock & Co., N. Y. and Boston.
Lundberg, Gustaf, Boston, Mass.**Iron, Sheet, Manufacturers of.**Cambridge Iron & Steel Co., Cambridge, Ohio.
W. Dewees Wood Co., Lim., McKeesport, Pa.**Ironwork, Ornamental.**Barnum, E. T., Detroit, Mich.
Champion Iron Co., Kenton, O.
Ludlow-Saylor Wire Co., St. Louis, Mo.
The Van Dorn Iron Works Co., Cleveland, O.**Keys.**

Wollensak, J. F., Chicago, Ill.

Knife and Tool Grinders.

Tracy, A. J. Co., Ltd., 18 Cliff St., N. Y.

Ladles.

Whiting Fdy. Equipment Co., Chicago, Ill.

Lanterns.Rochester Lamp Co., 42 Park Place, New York.
Steam Gauge & Lantern Co., Syracuse, N. Y.**Lathes.**Dietz, Schumacher & Co., Cincinnati, O.
Draper Machine Tool Co., Worcester, Mass.
Harrington, E. Son & Co., Phila., Pa.
Johnson, Israel H., Jr. & Co., Philadelphia, Pa.
New Haven Mfg. Co., New Haven, Conn.
Sebastian Lathe Co., Cincinnati, O.
Seneca Falls Mfg. Co., Seneca Falls, N. Y.**Lathing, Expanded Metal.**

Chess Bros., Pittsburgh, Pa.

Lathing, Wire.Clinton Wire Cloth Co., Clinton, Mass.
N. J. Wire Cloth Co., Trenton, N. J.
Wright & Colton Wire Cloth Co., Worcester, Mass.**Lawn Mowers.**Blair Mfg. Co., Springfield, Mass.
Chadborn & Coldwell Mfg. Co., Newburg, N. Y.
Coldwell Lawn Mower Co., Newburg, N. Y.
F. & N. Mfg. Co., Richmond, Ind.
Henley, M. C., Richmond, Ind.
Supplie Hdw. Co., Phila., Pa.**Lawn Rakes.**Gibbs Mfg. Co., Canton, Ohio.
Kohler, F. E. & Co., Canton, O.**Lawn Sprinklers.**Blair Mfg. Co., Springfield, Mass.
Ette & Henger Mfg. Co., St. Louis, Mo.
Graham, John H. & Co., 113 Chambers St., N. Y.
McGowan, John H. Co., Cincinnati, O.
Portland Lawn Sprinkler Co., Portland, Me.**Letters and Figures, Metallic.**

White, A. A. & Co., Providence, R. I.

Letters, Paper.

Tablet & Ticket Co., Chicago, Ill.

Levels.

Richardson, C. F. & Son, Athol, Mass.

Locks and Knobs, Manufacturers of.Dietz, A. E., 97 Chambers, N. Y.
Reading Hdw. Co., Reading, Pa.
Smith & Egge Mfg. Co., Bridgeport, Conn.**Lubricants.**

Dixon, Jos., Crucible Co., Jersey City, N. J.

Machinery.Am. Tool Works, Cleveland, Ohio.
Ayer, H. C. & Gleason Co., Phila., Pa.
Barnes, W. F. & John, Rockford, Ill.
Bement, Miles & Co., Philadelphia, Pa.
Bigelow, C. E., 45 Dey, N. Y.
Bigall & Keeler Mfg. Co., St. Louis.
Bliss, E. W. Co., Brooklyn, N. Y.
Bridgeport Mch. Tool Works, Bridgeport, Conn.
Briggs, Marvin, 12 Broadway, N. Y.
Carlin's Sons, Thos., Allegheny, Pa.
Clapp, Geo. M., agt., 74 Cortlandt, N. Y.
Detrick & Harvey Mch. Co., Baltimore, Md.
Dietz, Schumacher & Co., Cincinnati, Ohio.
Fitchburg Mch. Works, Fitchburg, Mass.
Garvin Mch. Co., Laight & Canal Sts.
Gould & Eberhardt, Newark, N. J.
Hamilton Mch. Tool Co., Hamilton, O.
Harrington, E. Son & Co., Phila., Pa.
Henderer, A. L., Wilmington, Del.
Hendy Machine Co., Torrington, Ct.
Hill, Clarke & Co., Boston, Mass.
Howard & Morse, 45 Fulton St., N. Y.
Johnson, Israel H., Jr. & Co., Phila.
Jones & Lamson Mch. Co., Springfield, Vt.
Lodge & Davis Mch. Tool Co., Cincinnati, O.
Lodge & Shipley Mch. Tool Co., Cincinnati, O.
McCabe, J. J., 68 Cortlandt, N. Y.
Machinery's Supply Co., Rochester, N. Y.
Manville, E. J., Mch. Co., Waterbury Conn.
Newark Mch. Tool Wks., Newark, N. J.
New Haven Mfg. Co., New Haven, Ct.
New York Machinery Depot, 178 Broadway, New York.
Niles Tool Wks., 138 Liberty St., N. Y.
Pittsburgh Mfg. Co., Pittsburgh, Pa.

Place, Geo., 145 Broadway, N. Y.
 Poole, Robt. & Son Co., Baltimore, Md.
 Powell Planer Co., Worcester, Mass.
 Prentiss Tool & Supply Co., N. Y.
 Scranton Supply & Mchry. Co., Scranton, Pa.
 Selbert, J. M., Philadelphia, Pa.
 Sellers, Wm. & Co., Phila.
 Seyfert's Sons, L. F., Philadelphia, Pa.
 Sigourney Tool Co., Hartford, Conn.
 Steptoe, J. & Co., Cincinnati, O.
 Stow Flexible Shaft Co., Ltd., Phila.
 Toomey, Frank, Philadelphia, Pa.
 Walker Mfg. Co., Cleveland, O.
 Wetherill, Robert & Co., Chester, Pa.
 Wilson, W. A., Rochester, N. Y.

Machinery for Hardware Manufacturers.

Adt, Jno. & Son, New Haven, Conn.

Machine Knives.

Loring, Coes & Co., Worcester, Mass.
 Simonds Mfg. Co., Fitchburg, Mass.

Machine Screws.

Rubbell, Harvey, Bridgeport, Ct.
 New Britain Hdw. Mfg. Co., New Britain, Conn.

Machine Tools.—See Machinery.

Machine Work.

Papping, J., 58th St. & 11th Ave., N. Y. City.

Machinists' Scales.

Coffin & Leighton, Syracuse, N. Y.
 Starrett, L. S., Athol, Mass.

Machinists' Tools and Supplies.

King, J. M. & Co., Waterford, N. Y.
 Sellers, Wm. & Co., Inc., Phila.

Manufacturing Sites.

Chicago, Milwaukee & St. Paul R. R., Chicago, Ill.

Measuring Tapes.

Keuffel & Esser Co., N. Y.

Meat Choppers.

Enterprise Mfg. Co., Philadelphia, Pa.

Meat Cutters.

North Bros. Mfg. Co., Philadelphia, Pa.

Mechanical Instruction.

Correspondence School of Mechanics, Scranton, Pa.

Metals.

Fearing, Wm. S., 100 Chambers, N. Y.
 Hendricks Bros., 49 Cliff, N. Y.

Metal Brokers.

American Metal Co., N. Y.

Metallurgists.

Britton, J. Blodgett, Phila., Pa.

Mining Knives.

Palmer Hdw. Mfg. Co., Troy, N. Y.

Mine Lamps.

Darby, Edw. & Sons, Phila., Pa.
 Leonard, B. E., Scranton, Pa.

Mining Screens.

Harrington & King Perforating Co., Chicago, Ill.
 Howard & Morse, 45 Fulton, N. Y.

Models, Makers of.

Franklin, H. H. Mfg. Co., Syracuse, N. Y.
 Ideal Machine Works, Hartford, Conn.

Molding Sand.

Obermayer, S. Co., Cincinnati, O.

Money Drawers.

Columbian Novelty Co., North East, Penna.

Motors, Water and Electric.

Bolgiano Mfg. Co., Baltimore, Md.
 C. & C. Electric Co., 402 and 404 Greenwich St., N. Y.
 Dallett, Thomas H. & Co., Phila., Pa.

Nail Machinery.

Pittsburgh Mfg. Co., Pittsburgh, Pa.

Nail and Tack Pullers.

Am. Specialty Co., Hartford, Conn.
 Scranton & Co., New Haven, Conn.

Nails (Cut) and Spikes.

Borden & Lovell, 70 West, N. Y.
 Pottstown Iron Co., Pottstown, Pa.
 Riverside Iron Wks., Wheeling, W. Va.

Nickel Plating.

Rhodes, L. E. Co., Hartford, Conn.

Norway Shapes, Rollers of.

Rowland, William & Harvey, Frankford, Philadelphia.

Novelty Manufacturers.

Franklin, B. H. Mfg., Syracuse, N. Y.
 Ideal Machine Works, Hartford, Conn.

Nut Machines.

Dunham Nut Co., Unionville, Ct.

Nuts, Bolts, &c., Makers of.

American Bolt Co., Lowell, Mass.
 American Screw Co., Providence, R. I.
 Blake & Johnson, Waterbury, Conn.
 Dunham Nut Co., Unionville, Conn.
 Haskell, Wm. H. Co., Pawtucket, R. I.
 Mt. Carmel Bolt Co., Mt. Carmel, Conn.
 Pennsylvania Bolt & Nut Co., Lebanon, Pa.
 Port Chester Bolt & Nut Co., Port Chester, N. Y.
 Russell, Burdall & Ward, Port Chester, N. Y.
 Sternbergh, J. H. & Son, Reading, Pa.
 Wilson, J. Fred, Worcester, Mass.
 Wm. H. Haskell Co., Pawtucket, R. I.

Oilers.

Wilnot & Hobbs Mfg. Co., Bridgeport, Conn.

Oil Stones.

Pike Mfg. Co., Pike Station, N. H.

Ores.

Wister, Francis, Philadelphia, Pa.

Ox Shoes.

Millers Falls Co., 93 Reade St., N. Y.
 Scranton Forging Co., Scranton, Pa.

Packing.

Morrison, Robert, St. Louis, Mo.
 N. Y. Belting & Packing Co., Ltd., N. Y.

Padlocks.

Ames Sword Co., Chicopee, Mass.
 Fraim, E. T., Lancaster, Pa.
 Wolf, W. & L., Phila., Pa.

Pails.

Richmond Cedar Wks., Richmond, Va.

Paint Burners.

Dangler Stove & Mfg. Co., Cleveland, Ohio.

Paint Cans.

Willmot & Hobbs Mfg. Co., Bridgeport, Conn.

Pants Stretcher.

Covert Mfg. Co., West Troy, N. Y.

Patent Solicitors.

Butler, C. N., Phila., Pa.
 Jenner, H. W. T., Washington, D. C.
 Howson & Howson, Philadelphia and Washington.
 Stocking, E. B., Washington, D. C.

Pattern Letters.

Wells, Heber, 157 William St., N. Y.

Perforated Metal.

Clinton Wire Cloth Co., Clinton, Mass.
 Harrington & King Perforating Co., Chicago, Ill.
 Hendrick Mfg. Co., Ltd., Carbondale, Pa.

Phosphor Bronze.

Phosphor Bronze Smelting Co., Limited, Philadelphia.

Phosphor Tin.

Crescent Phosphorized Metal Co., Philadelphia, Pa.
 Halk & Naumann, 516 Pearl, N. Y.

Picks and Mattocks.

Plumb, Fayette R., Philadelphia, Pa.

Pig Iron.

Houston, C. B. & Co., Philadelphia, Pa.
 Montour Iron & Steel Co., Danville, Pa.
 Naylor & Co., 45 Wall, N. Y.
 Pilling & Crane, Philadelphia, Pa.
 Samuel, Frank, Philadelphia, Pa.

Pig Iron Storage.

Am. Pig Iron Storage Warrant Co., 44 Wall, N. Y.

Pile Drivers.

Vulcan Iron Works, Chicago, Ill.

Pipe, Bent.

National Pipe Bending Co., New Haven, Conn.

Pipe Cutting and Threading Machines.

Armstrong Mfg. Co., Bridgeport, Conn.
 Bignall & Keeler Mfg. Co., St. Louis, Mo.
 Detrick & Harvey Mch. Co., Baltimore, Md.
 Merrill Mfg. Co., Toledo, O.
 Pancoast, Henry B. & Co., Phila.
 Saunders, Sons, D., Yonkers, N. Y.
 Walworth Mfg. Co., Boston, Mass.

Pipe Grips.

Prentiss Vise Co., 44 Barclay, N. Y.

Pipes, Fittings, &c., Makers of.

McNab & Harlin Mfg. Co., N. Y.

Pipe, Water and Gas, Makers of.

Donaldson Iron Co., Emaus, Pa.
 Riverside Iron Works, Wheeling, W. Va.
 Wood, R. D. & Co., Philadelphia, Pa.

Plane Irons, Manufacturers of.

Buck Bros., Millbury, Mass.
 Buck, Chas., Millbury, Mass.

Planers.

Denick & Harvey Mch. Co., Baltimore, Md.
 New Haven Mfg. Co., New Haven, Conn.
 Powell Planer Co., Worcester, Mass.
 Wilson, W. A., Worcester, Mass.

Planes, Manufacturers of.

Stanley Rule & Level Co., N. Y.

Plated Ware.

Boardman, L. & Son, New Haddam, Ct.
 Holmes & Edwards Silver Co., Bridgeport, Conn.
 Rogers, Wm. Mfg. Co., Hartford, Ct.

Plate, Iron and Steel, Mfrs. of.

Etna-Standard Iron & Steel Co., Bridgeport, O.
 Lukens Iron & Steel Co., Coatesville, Pa.
 Mahoning Valley Iron Co., Youngstown, Ohio.
 Moorhead-McLean Co., Pittsburgh, Pa.
 McIlvain & Sons, Reading, Pa.
 Pottstown Iron Co., Pottstown, Pa.
 Pottsville Iron & Steel Co., Pottsville, Pa.
 Singer, Nimick & Co., Pittsburgh, Pa.
 The Mahoning Valley Iron Co., Youngstown, O.
 Wood, Alan Co., Philadelphia.

Plating, Nickel, Brass and Silver.

Wilnot & Hobbs Mfg. Co., Bridgeport, Conn.

Polishing Machines.

Watson & Stillman, 204 E. 43d, N. Y.

Post Hole Diggers.

Gibbs Mfg. Co., Canton, Ohio.
 Kohler, F. E. & Co., Canton, O.

Poultry Nettings.

Barnum, E. T., Detroit, Mich.
 Gilbert & Bennett Mfg. Co., 42 Cliff St., N. Y.
 N. Y. Wire Cloth Co., Trenton, N. J.
 "Silver Finish."
 Tyler Wire Works Co., W. S., Cleveland, O.
 Wright & Colton Wire Cloth Co., Worcester, Mass.

Powder.

Lafin & Rand Powder Co., 29 Murray.
 New York Powder Co., 62 Liberty St., N. Y.

Power Hammers.

Dienelt & Eisenhardt, Philadelphia.
 Dupont Mfg. Co., St. Johnsbury, Vt.
 Jenkins & Linkie, Bellefonte, Pa.
 Long & Alstatter Co., Hamilton, Ohio.
 Miner & Peck Mfg. Co., New Haven, Conn.
 Scranton & Co., New Haven, Conn.

Power Transmitting Machinery.

Dodge Mfg. Co., Mishawaka, Ind.

Presses, Dies, &c.

E. W. Bliss Co., Brooklyn, N. Y.
 Crosby, G. A. & Co., Chicago, Ill.
 Stark Mch. & Tool Co., Buffalo, N. Y.
 Stiles & Parker Press Co., Brooklyn, N. Y.
 Waterbury Mch. Co., Waterbury, Ct.

Presses, Power, Makers of.

Bliss, E. W. Co., Brooklyn, N. Y.
 Manville, E. J. Mch. Co., Waterbury, Ct.
 Merriman, A. H., Meriden, Conn.
 Stark Mch. & Tool Co., Buffalo, N. Y.
 Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

Printers.

Griffith, Axtell & Cady Co., Holyoke, Mass.

Pruning Knives.

Gibbs Mfg. Co., Canton, O.

Pulleys.

Brown, A. & F., 17 Dey St., N. Y.
 Dodge Mfg. Co., Mishawaka, Ind.
 Keystone Clutch Mch. Wks., Phila., Pa.

Pulverizing Mills.

Bradley Pulverizer Co., Boston, Mass.

Pumping Machinery.

Dean Bros. Steam Pump Works, Indianapolis, Ind.
 Goulds Mfg. Co., Seneca Falls, N. Y.
 Hooker-Colville Steam Pump Co., St. Louis, Mo.
 McGowan, J. H. & Co., Cincinnati, O.
 Maslin, J. & Son, Jersey City, N. J.
 Norwalk Iron Works Co., So. Norwalk, Conn.
 Southwark Fdy. & Mch. Co., Phila., Pa.
 Valley Pump Works, Easthampton, Mass.
 Worthington, Henry R., 86 and 88 Liberty St., N. Y.

Pumps, Makers of.

Deming Co., Salem, O.
 Douglas, W. & B., Middletown, Conn.
 Goulds Mfg. Co., Seneca Falls, N. Y.
 Miller, C. & Sons, Utica, N. Y.
 Myers, F. E. & Bro., Ashland, O.
 Red Jacket Mfg. Co., Davenport, Iowa.

Punches.

Richards, I. P., Providence, R. I.

Punches and Shears, Hand and Power.

E. W. Bliss Co., Brooklyn, N. Y.
 Crosby, G. A. & Co., Chicago, Ill.
 Long & Alstatter Co., Hamilton, Ohio.
 Henderer, A. L., Wilmington, Del.
 Stark Mch. & Tool Co., Buffalo, N. Y.
 Stiles & Parker Press Co., Brooklyn, N. Y.
 Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.
 Watson & Stillman, 204 E. 43d, N. Y.

Rails, Old and New.

Perry, W. H. & Co., Providence, R. I.

Rat and Mouse Traps.

Estey, W. S., 65 Fulton, N. Y.

Razor Sharpener.

Dame, Stoddard & Kendall, Boston, Mass.

Razors, Manufacturers of.

Torrey, J. R. Razor Co., Worcester, Mass.

Reels.

Hendryx, A. B. Co., New Haven, Conn.

Refrigerator Door Fasteners.

Conroy, P. J. & Co., Philadelphia.

Rivets.

Blake & Johnson, Waterbury, Conn.
 Boyce Rivet Co., Muncie, Ind.
 Burden Iron Co., Troy, N. Y.
 Clark & Cowles, Plainville, Conn.
 Cobb & Drew, Plymouth, Mass.
 Sternbergh, J. H. & Son, Reading, Pa.
 Townsend, W. P. & Co., New Brighton, Pa.

Riveting Machines.

Adt, Jno. & Sons, New Haven, Conn.

Rolling Mill Machinery.

Birmingham Iron Fdry, Birmingham, Conn.
 Booth, The Lloyd Co., Youngstown, O.
 Leeburg Foundry & Mch. Co., Pittsburgh, Pa.
 Morgan Construction Co., Worcester, Mass.
 Robinson-Rea Mfg. Co., Pittsburgh, Pa.
 Totten & Hogg Iron and Steel Fdry Co., Pittsburgh, Pa.
 Trechewy Mfg. Co., Pittsburgh, Pa.
 Waterbury Farrel Foundry & Mch. Co., Waterbury, Conn.

Rolls, Chilled, Sand and Steel.

Birmingham Iron Foundry, Birmingham, Conn.

Booth, The Lloyd Co., Youngstown, O.
 East Chicago Fdry Co., Chicago, Ill.
 Garrison, A. Fdry. Co., Pittsburgh, Pa.
 Robinson-Rea Mfg. Co., Pittsburgh, Pa.
 Seaman, Sleeth & Black, Pittsburgh.
 Totten & Hogg Iron and Steel Fdry Co., Pittsburgh, Pa.

Roll Paper Holders.

Streeter, N. R. & Co., Groton, N. Y.

Roofing.

Cambridge Roofing Co., Cambridge, O.
 Cincinnati Corrugating Co., Piqua, O.
 Kanneberg Roofing Co., Canton, O.
 N. Y. Iron Roofing & Corrugating Co., Jersey City, N. J.

Rope and Web Goods.

Covert Mfg. Co., West Troy, N. Y.

Covert's Saddlery Wks., Farmer, N. Y.

Rope Wheels.

Cresson, Geo. V. Co., Philadelphia, Pa.

Rubber Goods.

Cannfield, H. O., Bridgeport, Conn.

Rules, Manufacturers of.

Keuffel & Esser Co., New York.

Stanley Rule & Level Co., 29 Chambers.

Rust Preventive.

Bridgeport Gun Implement Co., 318-316 Broadway, N. Y.

Sad Irons.

Enterprise Mfg. Co., Phila., Pa.

Streeter, N. R. & Co., Groton, N. Y.

Sad Irons, Gas.

Bolgiano Mfg. Co., Baltimore, Md.

Sand Paper.

Baeder, Adamson & Co., Phila., Pa.

Sash Balances.

Caldwell Mfg. Co., Rochester, N. Y.

Pullman Sash Balance Co., Rochester, N. Y.

Sash Cords and Chains.

Morton, Thos., 45 Elizabeth, N. Y.

Ossawa Mills Co., Norwich, Conn.

Samson Cordage Works, Boston, Mass.

Smith & Egge Mfg. Co., Bridgeport.

Sash Fasteners.

Wooster, F. V., Boston, Mass.

Sash Locks.

Champion Safety Lock Co., Cleveland, Ohio.

Sash Pulleys.

Palmer Hardware Mfg. Co., Troy, N. Y.

Allentown Rolling Mill, Allentown, Pa.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
Pascale Rolling Mill Co., Paterson, N.J.
Pottsville Iron & Steel Co., Pottsville, Pa.
Roberts, A. & P. & Co., Phila., Pa.
The Phoenix Iron Co., Phila., Pa.
Tudor Iron Works, St. Louis, Mo.

Shears and Scissors.

Acme Shear Co., Bridgeport, Conn.
Clauss Shear Co., Fremont, Ohio.
Heinrichs, R. Sons Co., Newark, N. J.

Sheet Iron and Steel, Manufacturers of.

Etna-Standard Iron and Steel Co., Bridgeport, O.
Cambridge Iron & Steel Co., Cambridge, Ohio.
Jersey City Galvanizing Co., 112 John St., N. Y.
Mahoning Valley Iron Co., Livingston, Ohio.
Morehead-McCleane Co., Pittsburgh, Pa.
Pearson & Co., 29 Broadway, N. Y.
Singer, Nimick & Co., Ltd., Pittsburgh, Pa.
The Mahoning Valley Iron Co., Youngstown, O.
Alan Wood Co., Philadelphia.
W. Dewees Wood Co., McKeesport, Pa.

Sheet Zinc.

Matthiessen & Hegeler Zinc Co., La Salle, Ill.

Shelf Brackets.

Atlas Mfg. Co., New Haven, Conn.
Stanley Works, New Britain, Conn.

Show Cases.

Union Show Case Co., Chicago, Ill.

Sinks.

Douglas, W. & B., Middletown, Conn.

Skates, Ice.

Keene Mfg. Co., Keene, N. H.
Winslow, Sam'l., Skate Mfg. Co., Worcester, Mass.

Skates, Roller.

Kenley, M. C., Richmond, Ind.
Winslow, Sam'l., Skate Mfg. Co., Worcester, Mass.

Slag Machines.

Cambria Iron Co., Johnstown, Pa.

Smelting Works.

Reeves, Paul S., 760 S. Broad, Phila.

Soldering Coppers.

Clendenin Bros., Baltimore, Md.
Covert Mfg. Co., West Troy, N. Y.

Speaking Tubes.

Ostrander, W. R. & Co., 204 Fulton St., N. Y.
Wollensak, J. F., Chicago, Ill.

Spelter.

Matthiessen & Hegeler Zinc Co., La Salle, Ill.
Missouri Metal Co., St. Louis, Mo.

Spoons and Forks.

Boardman, L. & Son, New Haddam, Conn.
Holmes & Edwards Silver Co., Bridgeport, Conn.
Rogers, The Wm. Mfg. Co., Hartford, Conn.

Sporting Goods.

Hartley & Graham, 318-315 B'way, N. Y.

Springes.

Clark & Cowles, Plainville, Ct.
Colled Wire Belting Co., Jersey City, N. J.
Dunbar Bros., Bristol, Conn.
Miller & Van Winkle, Brooklyn, N. Y.
Morgan Spring Co., Worcester, Mass.
Roland, Wm. & Harvey, Phila., Pa.
Sabin Machine Co., Montpelier, Vt.
Tuck Mfg. Co., Brockton, Mass.
Washburn & Moen Mfg. Co., Worcester, Mass.
Wolff, R. H. & Co., Ltd., 118th St. and Harlem River, N. Y.

Spring Hinges.

Bommer Bros., Brooklyn, N. Y.
Fullman Sash Balance Co., Rochester, N. Y.
Stover Mfg. Co., Freeport, Ill.
Van Wagener & Williams Hdw. Co., 14 Warren St., N. Y.

Stamping Works.

Avery Stamping Co., Cleveland, O.
Cleveland Stamping & Tool Co., Cleveland, O.

Staples.

Cobb & Drew, Plymouth, Mass.
Titchener, E. H. & Co., Binghamton, N. Y.

Steam Gauges.

Bristol Co., Waterbury, Conn.

Steam Hammers, &c., Makers of.

Dienelt & Eisenhart, Philadelphia.
Dudgeon, Richard, 24 Columbia Street, N. Y.
Trethewey Mfg. Co., Pittsburgh, Pa.

Steam Heating & Oil Separators.

Webster, Warren & Co., Camden, N. J.

Steam Separators.

Harrison Safety Boiler Wks., Phila., Pa.
Webster, Warren & Co., Camden, N. J.

Steam Specialties.

Lunkenhelmer Co., Cincinnati, O.

Steel Cold Rolled Strip.

Superior Steel Co., Pittsburgh, Pa.
Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.

Steel Figures and Alphabet.

Krogsrud, W., 61 Fulton St., N. Y.

Steel Importers.

Abbott, Wheelock & Co., N. Y. and Boston.
Hobson, Francis, Seaman & Co., 97 John St., N. Y.
Jessop, Wm. & Sons, Sheffield, England, or 91 John, N. Y.
Milne, A. & Co., 1 Broadway, N. Y.
Newton & Shipman, 83 John, N. Y.
Wetherell Bros., 93 Liberty St., N. Y.
Whitney, A. R. & Co., B'way, N. Y.
Wolff, R. H. & Co., Ltd., 118th Street and Harlem River, N. Y.

Steel (Mushet's Special).

Jones, B. M. & Co., Boston.

Steel Manufacturers.

Etna-Standard Iron & Steel Co., Bridgeport, O.
Bethlehem Iron Co., S. Bethlehem, Pa.
Baker, Hermann & Co., 103 Duane St.
Carbon Steel Co., Pittsburgh, Pa.
Chester Steel Castings Co., Phila., Pa.
Chrome Steel Works, Brooklyn, N. Y.
Crecent Steel Co., Pittsburgh, Pa.
Frankford Steel Co., Philadelphia.
Gautier Steel Department of Cambria Iron Co., Johnstown, Pa.
Hobson, Francis, Seaman & Co., 97 John St., N. Y.
Jessop, Wm. & Sons, Sheffield, England, or 91 John, N. Y.
Kayser, Ellison & Co., Sheffield, Eng.
La Belle Steel Co., Pittsburgh, Pa.
Lukens Iron & Steel Co., Coatesville, Pa.
Moorhead-McCleane Co., Pittsburgh, Pa.
Moss, F. W., 83 John, N. Y.
Pottsville Iron and Steel Co., Pottsville, Pa.
Bowland, Wm. & Harvey, Frankford, Philadelphia.
Singer, Nimick & Co., Pittsburgh, Pa.
Superior Steel Co., Pittsburgh, Pa.
Wordlaw, S. & C., Sheffield, Eng.
Wetherell Bros., 93 Liberty, N. Y.
Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.

Steel, Manufacturers' Agents.

Barns, C. K. & Co., Philadelphia, Pa.
Butze, Adolph, St. Louis, Mo.
Corning, Edw. & Co., 29 B'way, N. Y.
Lindsay, Jas. G. & Co., Phila., Pa.
Pearson & Co., 29 Broadway, N. Y.

Steel Rails, Manufacturers of.

Bethlehem Iron Co., S. Bethlehem, Pa.
Cambria Iron Co., Johnstown, Pa.
Montour Iron & Steel Co., Danville, Pa.
Riverside Iron Wks., Wheeling, W. Va.

Steel, Tool.

Frankford Steel Co., Philadelphia, Pa.
Jessop, Wm. & Sons, Sheffield, England, 91 John, N. Y.
Jones, B. M. & Co., Boston, Mass.
La Belle Steel Co., Pittsburgh, Pa.

Step Ladders, Rolling.

Bicycle Step Ladder Co., Chicago, Ill.
Coburn Trolley Track Mfg. Co., Holyoke, Mass.
Croissant, M., Albany, N. Y.

Stocks and Dies.

Armstrong Mfg. Co., Bridgeport, Conn.
Billings & Spencer Co., Hartford, Conn.
Butterfield & Co., Derby Line, Vt.
Hart Mfg. Co., Cleveland, O.
Oster Mfg. Co., Cleveland, O.
Saunders & Sons, D., Yonkers, N. Y.
Wells Bros. & Co., Greenfield, Mass.
Wiley & Russell Mfg. Co., Greenfield, Mass.

Stone Saws and Planers.

Lincoln Iron Works, Rutland, Vt.

Stove Linings.

Ostrander Fire Brick Co., Troy, N. Y.

Stove Pipe Thimbles.

Cheney, S. & Son, Manlius, N. Y.

Stove Trucks.

Randall & Ward, Le Roy, N. Y.

Street Lamps.

Rochester Lamp Co., 42 Park Place, New York.
Steam Gauge & Lantern Co., Syracuse, N. Y.

Structural Iron Work.

Lindsay, Jas. G. & Co., Phila., Pa.

Sulphuric Acid.

Matthiessen & Hegeler Zinc Co., La Salle, Ill.

Tacks, Brads, Staples, &c.

Atlas Tack Corporation, Boston, Mass.
Cheese Bros., Pittsburgh, Pa.
Clendenin Bros., Baltimore, Md.
Cobb & Drew, Plymouth, Mass.
Grand Crossing Tack Co., Grand Crossing, Ill.

Tack and Nail Machinery.

Kimbal Bros. & Co., Brockton, Mass.

Taps and Dies.

Butterfield & Co., Derby Line, Vt.
Carpenter, J. M., Tap & Die Co., Pawtucket, R. I.
Manning, Maxwell & Moore, 111 Liberty St., N. Y.
Wells Bros. & Co., Greenfield, Mass.
Wiley & Russell Mfg. Co., Greenfield, Mass.

Testing Laboratories.

Riehle Bros. Testing Mach. Co., Philadelphia.

Testing Machines.

Riehle Bros. Testing Mach. Co., Phila.

Theatrical Hardware.

Wollensak, J. F., Chicago, Ill.

Thill Springs.

Frost Thill Spring Co., Boston, Mass.
Sabin Machine Co., Montpelier, Vt.

Thrust Collars.

Gouverneur Mach. Co., Gouverneur, N. Y.

Time Record.

Scattergood, H. W., Phila., Pa.

Tin Plate Machinery.

Lloyd Booth Co., Youngstown, Ohio.

Tinning Process.

Sands, Thos., Nashua, N. H.

Tire Upsetters.

Butts & Ordway, Boston, Mass.

Toe Calks, Steel.

Burke, P. F., Boston, Mass.

Tool Chests.

Am. Tool Co., 200 W. Houston St., N. Y.

Tool Holders.

Armstrong Bros. Tool Co., Chicago, Ill.

Tools.

Brown, R. H. & Co., New Haven, Conn.
Mayhew, H. H. Co., Shelburne Falls, Mass.
Millers Falls Co., 93 Reade, N. Y.
Richardson, C. F. & Son, Athol, Mass.
Standard Tool Co., Athol, Mass.
Stanley Rule & Level Co., 29 Chambers.
Starrett, L. S., Athol, Mass.
Stevens, J. Arms & Tool Co., Chicopee Falls, Mass.

Tools, Blacksmith and Wheelwright.

Buffalo Forge Co., Buffalo, N. Y.
Butts & Ordway, Boston, Mass.
Champion Blower & Forge Co., Lancaster, Pa.
Oster Mfg. Co., Cleveland, Ohio.
Plumb, Fayette R., Philadelphia, Pa.
Wiley & Russell Mfg. Co., Greenfield, Mass.

Tools, Steam and Gas Fitters'.

Saunders' Sons, D., Yonkers, N. Y.

Torches, Oil and Gasoline.

Dangler Stove & Mfg. Co., Cleveland, O.
Schneider & Trenkamp Co., Cleveland, Ohio.

Transom Lifters.

Wollensak, J. F., Chicago, Ill.

Trucks, Manufacturers of.

Clark, G. F., Windsor Locks, Conn.

Tubes, Seamless Drawn Copper.

Ansonia Brass & Copper Co., 19 and 21 Cliff, N. Y.
Randolph & Clowes, Waterbury, Conn.

Tubes, Steel.

Avery Stamping Co., Cleveland, O.
Leah's, John S. Son & Co., Fletcher St., New York.
U. S. Projectile Co., Brooklyn, N. Y.

Tumbling Barrels.

Henderson Bros., Waterbury, Conn.

Turnbuckles.

Cleveland City Forge & Iron Co., Cleveland, O.
Merrill Bros., Brooklyn, E. D.

Twist Drills, Makers of.

Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford, Mass.
New Process Twist Drill Co., Taunton, Mass.
Standard Tool Co., Cleveland.

Valves, Gas, Water and Steam.

Chapman Valve Mfg. Co., Boston.
Eynon-Evans Mfg. Co., Philadelphia, Pa.
Johns Bros., 71 John, N. Y.
Lunkenhelmer Co., Cincinnati, O.
McNab & Harlin Mfg. Co., 56 John, N. Y.

Ventilator Appliances.

Howard & Morse, 45 Fulton St., N. Y.

Vise Jaws.

Newark Mch. Tool Co., Newark, N. J.

Vises.

Hollands Mfg. Co., Erie, Pa.
Howard Iron Works, Buffalo, N. Y.
Millers Falls Co., 93 Reade St., N. Y.
Parker, Chas. Co., Meriden, Conn.
Prentiss Vise Co., 44 Barclay, N. Y.

Wagon Jacks.

Covert Mfg. Co., West Troy, N. Y.
Covert's Saddlery Works, Farmer, N. Y.

Washers.

Haskell, Wm. H. Co., Pawtucket, R. I.
Milton Mfg. Co., Milton, Pa.
Newbury, Jay Herbert, Guilderland, N. Y.
Sternbergh, J. H. & Son, Reading, Pa.

Washing Machines.

Richmond Cedar Wks., Richmond, Va.

Water Meters.

Worthington, Henry R., 86 & 88 Liberty St., N. Y.

Water Wheels.

Poole, Robt. & Son Co., Baltimore, Md.

Wheelbarrows.

Amer. Steel Scraper Co., Sidney, Ohio.
Bryan Mfg. Co., Bryan, Ohio.
Sidney Steel Scraper Co., Sidney, O.

Window Cord, Makers of.

Samson Cordage Works, Boston, Mass.

Wire, Manufacturers of.

Gautier Steel Department of Cambria Iron Co., Johnstown, Pa.
Miller & Van Winkle, Brooklyn, N. Y.
New Castle Wire Nail Co., New Castle, Pa.
New Haven Wire Mfg. Co., New Haven, Conn.
Prentiss, Geo. W. & Co., Holyoke, Mass.
Salem Wire Nail Co., Salem, O.
Trenton Iron Co., Trenton, N. J.
Washburn & Moen Mfg. Co., Worcester.
Wetherell Bros., 93 Liberty St., N. Y.
Wolff, R. H. & Co., Ltd., 118th St. and Harlem River, N. Y.
Wright & Colton Wire Cloth Co., Worcester, Mass.

Wire Cloth.

Barnum, E. T., Detroit, Mich.
Clinton Wire Cloth Co., Clinton, Mass.
Darby, Edward & Sons, Philadelphia.
Estey, W. S., 65 Fulton, N. Y.
Gilbert & Bennett Mfg. Co., 42 Cliff.
Howard & Morse, 45 Fulton, N. Y.
Ludlow-Saylor Wire Co., St. Louis, Mo.
N. J. Wire Cloth Co., Trenton, N. J.
Scheeler & Sons, Buffalo, N. Y.
Wickwire Bros., Cortland, N. Y.
Wright & Colton Wire Cloth Co., Worcester, Mass.
W. S. Tyler Wire Works Co., Cleve'd.

Wire Cutters.

King, J. M. & Co., Watertown, N. Y.

Wire Dies.

McFarland, Wm., Trenton, N. J.
Newton & Shipman, 83 John St., N. Y.

Wire Fences, See Fencing, Iron and Wire.

Wire Goods, Manufacturers of.

Bromwell Brush & Wire Goods Co., Cincinnati, Ohio.
Darby, Edward & Sons, Phila.
Gilbert & Bennett Mfg. Co., 42 Cliff St., N. Y.
Ludlow-Saylor Wire Co., St. Louis.
Ossawan Mills Co., Norwich, Conn.
Scheeler & Sons, Buffalo, N. Y.
Wickwire Bros., Cortland, N. Y.
Williamson, C. T., Wire Novelty Co., Newark, N. J.
Wire Goods Co., Worcester, Mass.

Wire Machinery.

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Morgan Construction Co., Worcester, Mass.
Waterbury Mch. Co., Waterbury, Conn.

Wire Straightening and Cutting Machinery.

Att, John & Son, New Haven, Conn.

Wire Nails.

Bond Nail Co., Raynham, Mass.
Indiana Wire Fence Co., Crawfordsville, Ind.
Kilmer Mfg. Co., Newburg, N. Y.
New Castle Wire Nail Co., New Castle, Pa.
Phillips, Townsend & Co., Phila., Pa.
Salem Wire Nail Co., Salem, O.
Taunton Wire Nail Co., Taunton, Mass.

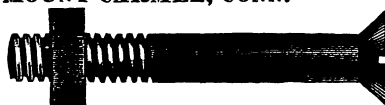
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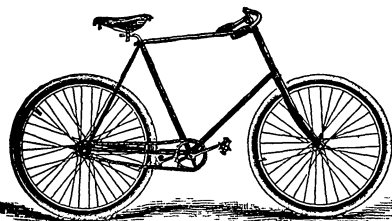
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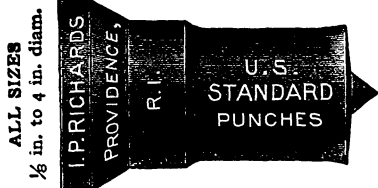
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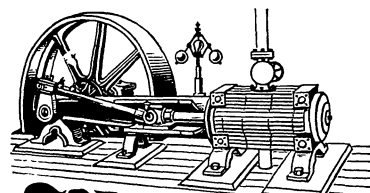
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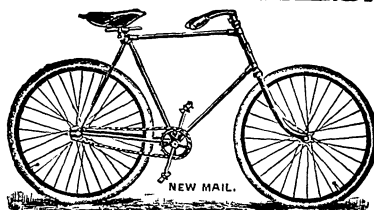
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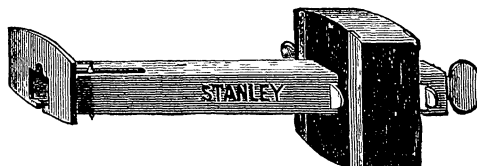
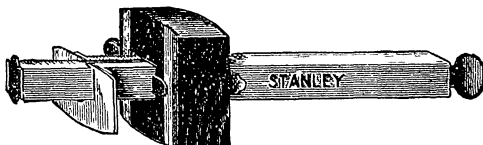
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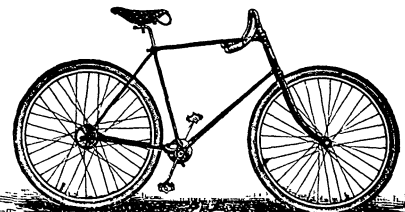
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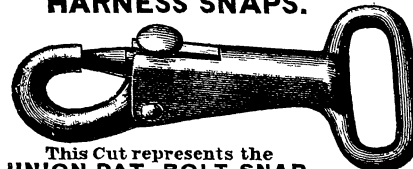
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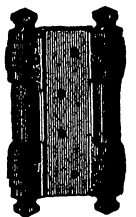
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THE IRON AGE

THURSDAY, AUGUST 23, 1894.

Strong's Internally Fired Return Tubular Boilers.

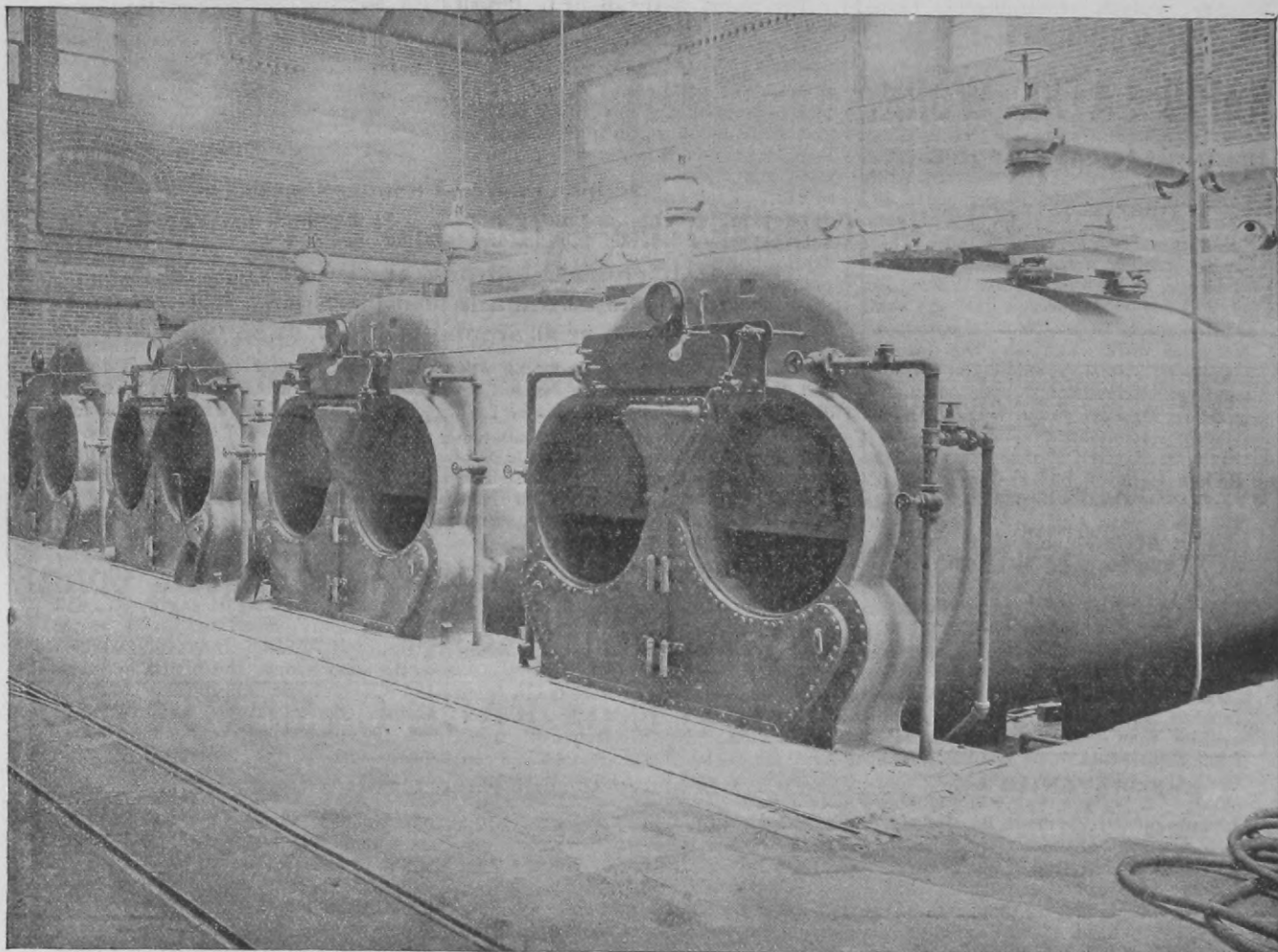
The internally fired return tubular boilers which we illustrate are located at the Ridgewood Pumping Station of the Brooklyn Water Works. They were built by the Edgemoor Iron Company of Wilmington, Del., in accordance with designs by George S. Strong of 1 Broadway, New York.

This plant was designed to meet what was considered to be a high duty or

tubes, as by so doing it would carry the water that should remain solid and in contact with the tubes away from the tubes and cause priming. So it was deemed best to locate the furnaces near the water line and place the tubes below the furnaces, thus allowing the steam thrown off by the furnaces to pass at once to the water line while hot and partially superheated. The gases pass from the ends of the furnaces, which are 18 feet long, into a brick lined chamber at the back of the boilers, which chamber is part of the shell

them to contract and expand without breaking loose at the place where the flue connection is made, and no leakage of air into the flue can take place.

The boilers are covered with 3 inches of asbestos cement, 1 inch air space, so that very little heat is radiated and the boiler room is comfortably cool in warm weather, while in winter, with no other means of heating, a man would find it necessary to go fully clothed or to work to keep warm. Thus the large loss of heat usual to brick set boilers is avoided. All the radiation of the heat



STRONG'S INTERNALLY FIRED RETURN TUBULAR BOILERS.

guaranteed requirement, *i. e.*, 10 pounds of water per pound of anthracite coal from a temperature of 212° F. to dry steam of 110 pounds above atmospheric pressure, each boiler to have a capacity of 6000 pounds of water per hour, and to be capable of evaporating 10,000 pounds of water under forced draft without loss of efficiency, or making wet steam, or without priming. Mr. Strong having had considerable experience with high rates of evaporation on locomotive types of boilers, and internally fired boilers, realized that the largest per cent. of the steam (80 per cent.) would be generated around the furnaces, and that to prevent priming when the boilers are forced, this 80 per cent. of the steam should not be forced through the tube chamber around the

and air tight, so that no leakage can occur. This back or combustion chamber is provided at the bottom with a hopper with a slide to receive any ashes that would otherwise be drawn into the tubes. The gases drop from the end of the furnaces into the tubes through which they return to the front and thence go into an underground flue or tunnel which leads to the stack located outside of the boiler house. There is a damper on the downtake of each boiler and a large one in the main flue just inside the wall of the boiler room, which latter damper is controlled by an automatic regulator.

The boilers are supported on a pier at the front, where they are built into the flue, and at the back are carried on a rocker with a safety pier, allowing

of the fire is here, having to take place through the water, the radiation is only that of the temperature of the water or steam, which at the pressure of 110 is 343.9°, while the temperature of the furnace would be 2000° to 2500°, so that the difference in radiation can be readily appreciated.

Chief Engineer B. F. Isherwood of the United States Navy, in commenting on the subject of heat radiation and air leakage before the American Society of Mechanical Engineers, said: "If you make the two boilers—the pipe boiler and the shell boiler—both with the same grate surface and the same heating surface, and burn the same quantity of coal in both per unit of time, it will be found that the pipe boiler gives about 10 per cent. less eco-

economic evaporation. That is to say, if one boiler will evaporate 10 pounds of water to the pound of coal, the other will evaporate but 9 pounds. Of course there is a reason for this, and I think it is very easy to see. It arises from the air leakage in the case of the water tube boiler. In the case of the shell boiler no air—no exterior air—can get mingled with the gases of combustion. The only air that enters is that entering through the furnace in the ash pit and over the bed of coal on the grate through the holes in the furnace door. Every particle of air that enters into and mingles with the gases of combustion after they have passed over the bridge wall reduces the economic evaporation of the boiler very largely. In the first place, it cools those gases so that they do not have the temperature upon the heating surfaces that they should, consequently cannot give the evaporation; and, in the second place, it requires a certain quantity of heat to force those gases out against the resistance of the atmosphere, the opposing resistance at the top of the chimney, which is also at the expense of the heat of the coal. The two things put together will make that difference about 10 per cent., as I have stated, of the economic evaporation of the two types of boiler. There is no practical way of excluding the air leakage, and while I am on this subject I will say that there is just the same difference of 10 per cent. in boilers set in brick work. You take the ordinary boiler with straight tubes and the shell and you set it in brick work. You have a brick furnace. You will never get the same economic evaporation from it as with a shell boiler—that is, the Scotch form of boiler—for the simple reason that there will percolate through the brick work setting a certain quantity of air very much larger than any one would suspect, and that reduces the economy of the evaporation. In the early days of my practice as an engineer I was confronted with the fact that all the boilers set in brick masonry gave a lower economic evaporation than those not so set. In other words, that the interior fired boiler gave a higher evaporation than the exterior fired boiler. I made quite a table of results from all the boilers of the two types that I could obtain. A very great many of those experiments were made by me, and I took the mean of them and I found that they approached the 10 per cent. very closely. I did not at that time know the reason. I had not the faintest idea of it. I thought it was something in the type of boiler. But really I could not reconcile it. I had the same grate surface, heating surface and combustion of coal in both cases. I could not see why this difference should be for a long while. But the difference was there as a practical fact, and it was caused, as I afterward ascertained, by what I have stated—the inleakage of air into the gases of combustion, cooling them and requiring more expenditure of heat to expel them from the chimney.”

Circulating plates are also arranged on either side, reaching from a point near the water line to a point near the bottom of the boiler, so that the water gets back to the bottom of the boiler without obstruction. The water then starts up through the tube chamber around the tubes, and then around and between the furnaces, which being the hottest, generate the most steam, and then it is thrown off at the water line; and as only 20 per cent. of the evaporation is done around the tubes, no priming or lifting of the water can take

place. As there is a very large amount of direct heating surface, every foot of which is stated to be worth 10 feet of tube surface, the boiler is capable of giving a very great capacity for a given number of square feet of heating surface. As it has been found very good economy to get a high rate of combustion per square foot of grate surface, better results being obtained with 20 pounds of coal per square foot of grate than where only 10 to 12 pounds are burned, and as above pointed out, no damage can occur from the higher temperature due to higher rates of combustion; it is therefore claimed that this boiler can be made to give a better result for a given first cost than any other class. The following is the result of tests made of these boilers at the Ridgewood pumping station, Brooklyn, N. Y.:

The report is signed by L. Russell Clapp, assistant engineer.

Requirements of Contract for Boilers.

—“The party of the first part shall construct, deliver and erect boilers of a type internally fired, fire boxes (corrugated) and capable of an evaporation of at least 10 pounds of water per pound of good coal, from and at a temperature of 212°. Each boiler will be capable of developing, under a natural draft, a horse-power of 300, and under a forced draft a horse-power of 500, allowing 20 pounds of water per horse-power.”

Method of Test.—The plant furnished by the Worthington Company consists of three duplex, vertical, direct acting pumping engines, numbered 813, 814 and 815, and four horizontal, internally fired, return flue boilers, numbered 248, 249, 250 and 251, together with the feed pumps and all necessary pipe connections, both steam and water. The boilers are from the Edgemoor Iron Company of Wilmington, Del., each 9 feet internal diameter and 22 feet long. One of the engines, No. 814, and two of the boilers were at work on the direct supply connected with the new 48-inch rising main delivering into the west division of Ridgewood reservoir when the tests began.

The tests of No. 814 were made from 10.30 a.m. to 6.30 p.m. on April 25, 1894. That of No. 815 from 10.15 a.m. April 26 to 10.15 a.m. April 27, a run of 24 hours, and No. 813 from 11 a.m. to 7 p.m. April 28, a run of eight hours.

Two boilers were used with each engine during all the trials, and the fires were fed with Plymouth coal, which we use daily at our pumping stations, the engine builders waiving their right to use selected coal. It was not specially screened, being taken from the overflow of coal fill in pocket. The condition, depth of fires and quantity of coal on grates were carefully noted by Mr. Foster of the H. R. Worthington Works, our engineer in charge of New Station, Mr. Faron and myself, at the beginning of the tests, and the same conditions were required at the end of the tests. The coal was weighed as used. Records were taken simultaneously at 15-minute intervals during all the tests, of the length and number of strokes, the steam and water pressure, the temperatures, &c. Indicator cards were taken from the high pressure, low pressure and water cylinders. Steam was examined by means of calorimeter tests. Gauges and scales were tested before and after the trials. The capacity of the engines was determined from the delivery of the pumps during the trials, as permitted in the requirements of the contract, owing mainly to the difficulty in setting a weir which would

fulfill all the conditions of weir formula. The results of tests, as noted below, were obtained after applying all necessary corrections.

Temperature.

Water in pump well...	56°	56°	58°
Air pump delivery.....	110.60	93.64	100.40
Feed water, average....	129.26	167.30	174.34
Engine room.....	83.00	84.00	79.00

Boiler Data.

Average steam pressure.....	107.50	109.43	109.44
Average barometric pressure, pounds....	14.758	14.724	14.620
Weight, 1 cubic foot feed water, pounds..	61.581	60.846	60.679
Dryness of steam, taken at engine .....	.992	.989	.997
Feed water through cylinders, pounds....	50.601	157.014	50.717
Feed water through jackets, pounds	3.542	7.851	3.550
Total feed water, pounds.....	54.143	164.865	54.267
Percentage of jacket water.....	7	* 5	7
Total coal used, pounds	5.230	16.026	5.120
Percentage of ash.....	9	9	9
Net combustible.....	4.805	14.584	4.659

* NOTE.—Two per cent. of jacket water lost by defective drain pipe.

Work of Boilers.

Evaporation (actual conditions) per pound coal, pounds.....	10.13	10.34	10.60
Evaporation from and at 212°, pounds	11.33	11.22	11.43
Evaporation combustible from and at 212°.	12.46	12.33	12.56

As mentioned before, I have determined the capacity and duty from the pump delivery alone, owing to the uncertainty of weir measurement with the facilities at hand. However, from the trials of the Worthington engines No. 486 and No. 487 at the same station and under similar conditions, I found that the engine capacity by weir was only 1 per cent. less than that by pump delivery, and trials of the same type of engines at other places show about 2 per cent. less, an average of 1½ per cent. If considered necessary this percentage can be taken from capacity and duty. The reduction will be small.

In conclusion I submit a summary of the tests:

I find the capacity of engine No. 813 for 24 hours' run, against a water pressure of 70.853 pounds (163,506 feet) to the square inch, at a piston speed of 135,874 feet per minute, is 12,354,000 United States gallons, an excess in capacity of 23½ per cent. over the requirements of the contract; that the capacity of engine No. 814 for same time, against a water pressure of 70.978 pounds (163,796 feet) per square inch, at a piston speed of 134,225 feet per minute, is 12,206,700 United States gallons, an excess of 22 per cent. over requirements, and of engine No. 815 for same time, against a water pressure of 70.826 pounds (163,444 feet) per square inch, at a piston speed of 129,756 feet per minute, is 11,800,000 United States gallons, an excess of 18 per cent. over requirements.

I find that the boilers at the time of the tests developed an average evaporative efficiency of 11,326 pounds of water from and at 212° F. per pound of coal consumed, using our ordinary coal (Plymouth) as a standard. Also, that at the time of trial the three engines developed an average duty of 1,050,970 foot pounds per pound of coal fed upon grates, an excess of 31½ per cent. above contract requirements. The internally fired type of boilers shows increased efficiency over those of the ordinary type used for the other Worthington engines. I find that the construction of the entire plant is such that repairs, inspection, &c., can be easily made; that it is thoroughly efficient, is beyond the contract requirements and that it will give an economical duty in its daily work.

The Bickford Drilling, Boring and Turning Machine.

Our illustration shows a 40-inch boring and turning mill in combination with a 40-inch upright drill of the latest design, built by the Bickford Drill & Tool Company of Cincinnati, Ohio. The machine in all its parts is constructed for durability, accuracy and convenience of handling, and many new features, the result of the long experience of the designers, have been introduced.

table spindle is brought exactly central with the drill spindle. Therefore no setting or adjusting is required. The table is indirectly driven from the top shaft of the machine by means of a steel miter wheel which matches into a miter wheel on the vertical shaft between the column and the back brace. On the end of this shaft, which can be raised or lowered to bring the miters out or into match, is a spur pinion, which drives, by means of the column surrounding the intermediate wheel, the spur ring of the table. By the peculiar appliance and combination of the gear-

holder. The carriage can be fed either automatically or by hand from the right to the left or *vice versa*, the same as on any ordinary turning mill.

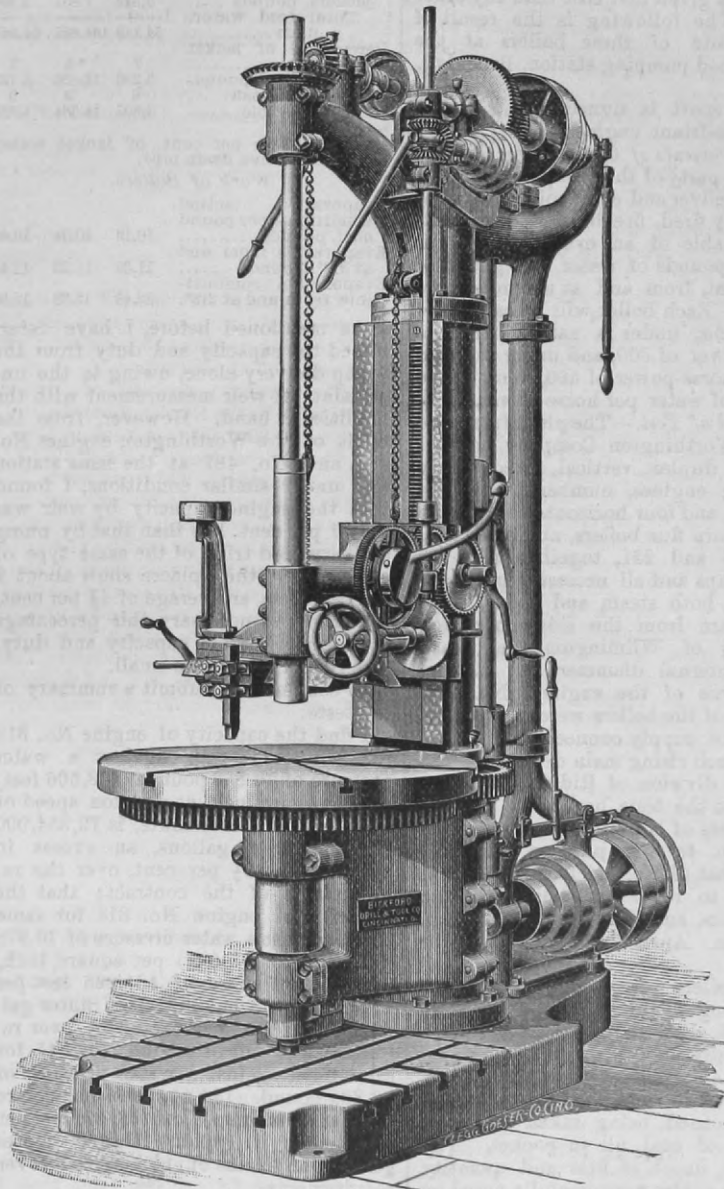
There are four different speeds for turning as well as for drilling or boring, and eight different speeds for the rotation of the table and spindle. The front arm or head and spindle are counterbalanced by a chain and weight. All handles for changing feeds or speeds of the machine are in convenient reach. The spindle shafts and studs, as well as the main gearing, are made of steel.

Steel Manufacture in the South.

BY C. A. MEISSNER, BIRMINGHAM, ALA.

The manufacture of steel in the South has been discussed from many standpoints, but as yet without permanently practical results. Various attempts have been made, some steel manufactured and a great many theories, as well as personal ideas, advanced of more or less practical value. The discussions, especially in *The Iron Age*, have been of great interest, and have brought out many points that will prove of value to those intending to look more deeply into the subject. Yet these discussions have been based more or less on purely theoretical or experimental grounds, and do not give sufficient facts and actual results of regularly continued operations to be of really practical value to a proposed investor who desires to make the manufacture of steel in the South a serious purpose. It is, therefore, well to call attention to the actual work done in the South in this direction. Bessemer steel will probably never be made in the South from exclusively Southern ores, as none of them are Bessemer ores except those in the Cranberry district of North Carolina.

The concentration and phosphorus elimination of Southern ores would be the only way to accomplish the manufacture of Bessemer steel, but it is doubtful if this can be done with sufficient economy on the scale necessary for a large steel plant. Whether some of the Western and Cuban Bessemer ores can be brought to Southern points, cheap enough to mix with some of our Southern ores, or be used alone for making Bessemer pig iron is a matter for the future to settle. It has been seriously discussed to bring Cuban ores to Mobile or Pensacola, and coke from Birmingham to these parts, and erect a Bessemer plant there to supply the Southern, Southwestern, Central and South American trade, but it is doubtful if this would prove successful, until the Nicaragua Canal had been built. Then such a project might become feasible, as it would open a market for rails as well to the western coast of the United States, Central and South American, and enable us to become competitors of English iron and steel, especially in South America. Cuban ore could be laid down at Mobile or Pensacola for from \$1.75 to \$2.50 per ton, averaging 60 per cent. in iron, and low enough in phosphorus for Bessemer purposes. Limestone can there be obtained at 50 cents per ton or less, f.o.b. schooner near Key West. Washed coke could probably be placed in either port at \$3.75 per ton or less, rate from Birmingham being \$1.75 per ton or less. Under such circumstances Bessemer pig iron could be made at Mobile or Pensacola for from \$10 to \$12 per ton. It would not seem profitable to try to have such a plant inland at Birmingham or other points, as the freight on ore from Mobile or Pensacola would hardly be



THE BICKFORD DRILLING, BORING AND TURNING MACHINE.

The table, or rather its strong spindle, revolves in the two long bearings of the swinging arm, and in addition is supported by a foot bearing, which is fastened rigidly to the base. A hardened steel toe is inserted in the end of the spindle, which toe finds its support on a hardened steel plate, which is always submerged in oil. This plate can be raised or lowered by means of a screw, according to the desired speed of the revolving table.

The table with its supporting arm can easily be swung around the column on anti-friction rollers, which are in an annular groove at the bottom of the arm. By fastening the foot bearing to the base plate the center line of the

ing on the top shaft, the spindle and table can revolve together, thus giving the machine the qualification of a double head boring and turning mill. The strong and heavy front arm slides on the V-shaped face of the column very easily. It has long jibbed bearings and can be raised or lowered either direct by crank handle or by worm and worm wheel and the same hand wheel which serves for feeding the drill spindle by hand. It can also be fed up and down by power, the same as the spindle, without much change in the feed mechanism, by throwing in an intermediate gear on an oscillating lever. The front arm has on the left side a strongly braced extension, which carries the carriage and tool

less than \$1.25 per ton, and as the main, if not exclusive, markets for Southern made rails would be South and West, it would add freights from the inland points which could be avoided by the Gulf ports. Should a coal trade of any proportions spring up with Cuba, ore freights might still be lower. Considerable interest has been manifested by iron and railroad men, as well as capitalists, in this question, but so far without definite results except extended investigations into Cuban ore properties, freight rates and possible coal shipments to Cuban points. The establishment of a naval coaling station by the United States Government at a point available to Southern coal and the opening of the Nicaragua Canal would give a tremendous impetus to Southern iron and coal interests and would undoubtedly lead to lessened competition in Northern territories by Southern iron plants on account of the opening and seeking of new outlets in new territories beyond the natural trade districts of Northern producers. It might in this way prove a double benefit to the whole iron industry of the country by relieving the congested territory now absorbing the entire competition of the iron trade.

This digression, while in itself partially theoretical, has reference only to Bessemer steel, and is intended to show some actual work done up to date in discussion and investigation in this branch of the Southern steel industry.

As to the manufacture of basic steel in the South, enough has been done in Birmingham, Chattanooga and Fort Payne to indicate that it is perfectly practicable, providing the projectors pursue the course that common sense and past experience would indicate. The first requirement of a successful steel plant is a first class practical and experienced steel manager and an able and trained corps of assistants, who should then have full control and responsibility of the practical management of the plant. The actual results of steel making in Alabama indicate that while money can build a plant, yet it cannot run it, unless combined with the highest scientific and technical skill. Basic steel is the very acme of science in the iron business, its results are so intimately dependent and based on chemical composition that none but a scientific and practical steel manager, experienced in his business, and economic in his ideas, can succeed. But in all previous attempts South lack of confidence in the scientific department, caused perhaps in some cases by too keen a desire on the part of this department to experiment with new processes, has brought ultimate failure financially, even after steel of good quality had been made with fair economy. To the departure from old and tried methods used in districts using similar material can be traced the greater part of the failure in this direction.

The first steel made in the South was acid Bessemer, made in 1882, at Trdeggar Iron Works from Cranberry ores in 2 or 3 ton converters; also some basic Bessemer made at the Roane Iron Works. Basic open hearth steel was made in Birmingham in 1888 by the Henderson Steel & Mfg. Company in a 2 ton Perrut furnace, lined with chrome ore, and later with magnesite. They made some 50 tons very fair steel, two heats of which were a good high carbon steel used for tools. They used the pig and scrap process. In 1889 the company built a 10-ton Siemens open hearth furnace, lined with magnesite, which they operated into 1890. Most

of this steel went to the Bessemer Rolling Mills. A sample lot was sent to John A. Roebling's Sons of Trenton. Results were pronounced favorable and steel was of good quality, uniform, soft and strong. The failure of the Bessemer mill stopped the only outlet of the steel plant, as no other Southern mill was equipped to roll their large ingots into billets. Low silicon pig was used with scrap. Pig was made at Bessemer. Native brown ores and limestones were used. A large amount of their steel was made from Birmingham pig sent to Chattanooga, there blown in a Bessemer converter, desilicized and the metal cast in chills and reshipped to Birmingham to be treated in the open hearth furnace in the ratio of 94 per cent. pig and 6 per cent. scrap. This was practically the duplex process. Silicon in pig was reduced to 0.25 per cent., with carbon at 3 per cent. The steel had less than 0.05 per cent. phosphorus and 0.10 per cent. carbon. This steel was very uniform, and some of it sold to agricultural works in competition with Gautier steel. The tensile strength of this steel was in one case 72,856 pounds persquare inch, 52.8 per cent. reduction in area; in another test, 48,100 pounds tensile strength, 32,030 pounds elastic limit, 54.7 per cent. reduction of area, 32 per cent. elongation. This steel was rolled into plates, rods, bars and shapes of all kinds, which were shipped to St. Louis and other Southern points. The Clarksville, Tenn., furnace was built largely out of this material. A number of boilers were made out of the plate, among which are two at the Comer Flouring Mills, Birmingham; four at Hercules Foundry, Pell City; two at Bessemer Rolling Mill, Bessemer, and many others. Several boilermakers have given preference to this plate with good results. In 1892 the Jefferson Steel Company bought the plant and made some changes to lessen cost of handling. A cupola was erected to experiment with liquid metal, but did not succeed, though several experiments were made with the pig and ore process and liquid metal. The iron used by the Jefferson Steel Company was mainly gray forge, and melted with scrap. This company ran the plant for some four months, making two heats in 24 hours. The product was shipped to the Birmingham Rolling Mills, who rolled it into plates and shapes. The plates stood tests better than Ashland steel, and small rails rolled out of this steel were of such good quality that some were reserved for places of greatest wear on the many trucks at the mill. When the mill shut down in 1893 the steel plant had to stop, and has not been operated since, but will probably resume under different management after the midsummer shutdown of the mills. As these mills will then be prepared to break down their large 8-inch ingots and cut 4 inch billets, the steel plant will gain a point in economic running by being able to cast larger ingots than heretofore. The steel made during the last three months' run of this company shows the following analysis as average heats made:

Basic Open Hearth Steel Made at Birmingham, Ala. Chemist, C. A. Meissner.

No.	Carbon.	Silicon.	Sulphur.	Phosphorus.	Manganese.
1	0.063	0.040	0.048	0.045	0.500
2	0.063	...	0.030	0.064	...
3	0.060	0.019	...	0.046	...
4	0.065	...	0.089	0.05	0.540
5	0.068	...	0.087	0.040	...
6	0.062	...	0.020	0.053	0.280
7	0.072	...	0.071	0.056	0.537
8	0.060	...	0.054	0.053	0.568

9	0.077	....	0.054	0.052	0.500
10	0.052	....	0.014	0.050	0.820
11	0.072	0.018	0.050	0.075	0.271
12	0.095	0.015	0.038	0.060	0.416
13	0.055	0.007	0.035	0.077	0.543

Pig irons used for making this steel were as follows:

Pig Irons Used in Making Steel at Birmingham, Ala. Chemist, C. A. Meissner.

No.	Grade.	Silicon.	Sulphur.	Phosphorus.	Magnesia.
1	3	2.10	0.084	....	....
2	3	2.40	0.027	....	....
3	3	3.10	0.010	....	....
4	gr F	2.25	0.038	....	....
5	gr F	2.72	0.065	....	....
6	2	4.20	0.034	0.560	0.450
7	1S	3.46	0.010	....	....

A special lot of 1000 tons pig iron made at Bessemer showed following analysis:

Special Pig Iron Made at Little Bell Furnace, at Bessemer, Ala. Chemist, C. A. Meissner.

No.	Silicon.	Sulphur.	Phosphorus.	Manganese.	Cast.
1	0.78	0.037	0.787	0.316	in sand.
2	0.81	0.033	....	....	in sand.
3	0.82	0.010	....	....	in sand.
4	0.93	0.084	0.754	0.379	in chills.
5	....	0.074	....	....	in chills.
6	0.84	0.014	....	....	....

The average analysis of brown ores used as oxidizing agents showed: Iron, 49 per cent.; silica, 15 per cent.; phosphorus, 0.500 per cent.

The average analysis of dolomite available in the Birmingham district is: Silica, 0.80-1.00 per cent.; alumina, 0.60-1.00 per cent.; lime, 30.00 per cent.; magnesia, 20.00 per cent.

At Chattanooga a 20-ton open hearth furnace with dolomite bottom was built in 1890 and run to 1892. The pig and scrap process was used; charcoal and low silicon coke iron likewise were melted. A good steel was made and a great deal of costly experimenting indulged in. Some of the tests showed: Tensile strength, 50,940, 48,360, and elongation, 41 per cent. and 50 per cent. respectively.

The dolomites used had the following composition:

	Talladega.	Sylacauga.	Gadsden.
	Per cent.	Per cent.	Per cent.
Silica	1.90	1.91	0.58
Alumina	0.84	0.80	0.32
Lime	30.00	30.00	33.00
Magnesia	21.05	21.00	18.50

Some of this steel went North, some they rolled themselves and sold the product.

At Fort Payne a steel plant was erected but only operated three weeks, making a very fine steel.

As to the cost of conversion, it is difficult to give accurate figures. Irregularity of running, experimenting and "experiencing," caused costs to be extremely irregular. It is claimed that cost of regular running was in 1892 and 1893 under \$8 per ton, and that total cost averaged from 16 to \$18 per ton, pig costing \$8 per ton, this was in small 600 pound ingots, bottom poured and not exceeding two heats in 24 hours. The pig iron can now be had at \$6.50 to \$7 per ton; iron ores at \$1.40 per ton or less, and the dolomite at 75 cents or less. Magnesite costing from \$35 to \$40 per ton.

In connection herewith the following figures may be of interest as to basic linings used by a Northern steel concern. They originally used magnesite but on account of expense tried dolomite successfully, retaining its use. The raw stone cost them 90 cents delivered. One pound burnt and prepared stone cost 0.19 cents and not prepared, 0.14 cents. The prepared stone was ground and mixed with tar; the unprepared is only ground and burnt and used as dephosphorizer. They found that 1

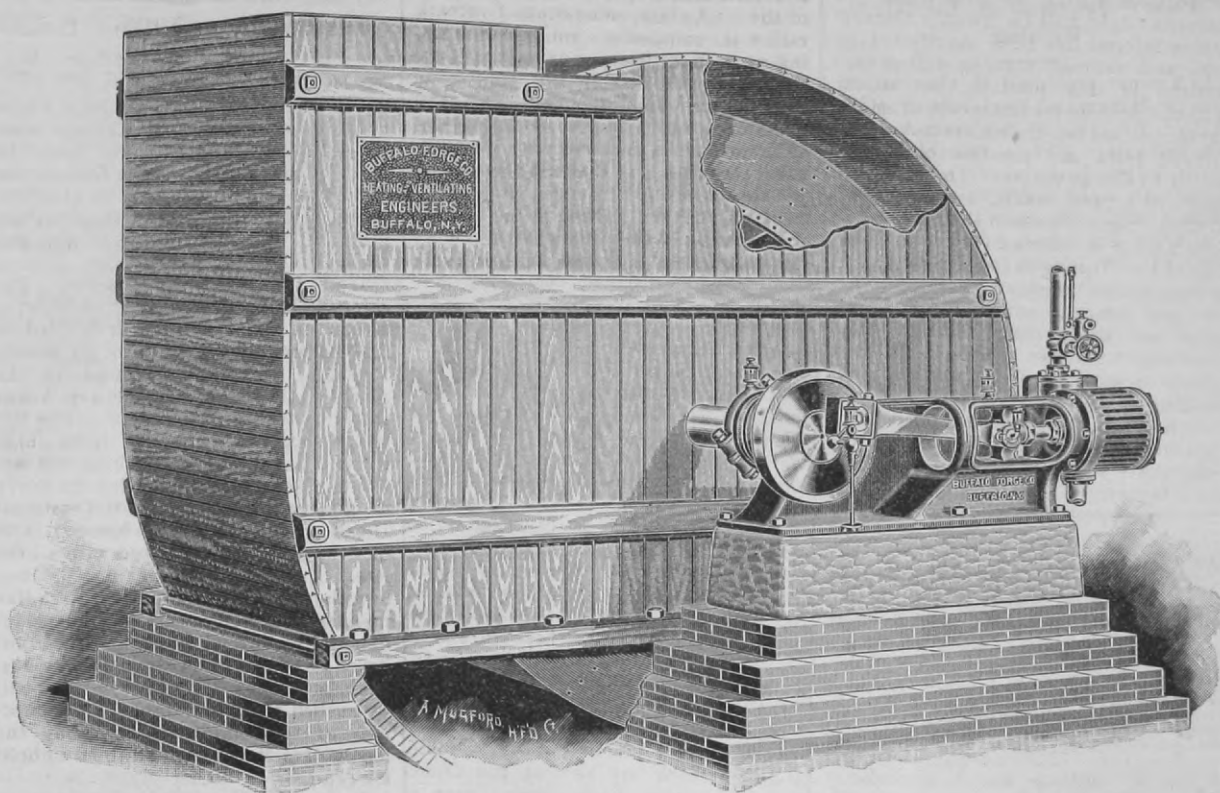
ton of ingots required 113 pounds dolomite, at a cost of 16 cents per ton, against a cost of 60 cents per ton when using magnesite.

Many of the tests and data here given are from notes collected by E. Prochaska, who has been connected

Buffalo Steel Plate Ventilating Fan.

The engravings here presented clearly show the design and construction of the steel plate fan wheels for mine ventilation, built by the Buffalo Forge Com-

plished through long tunnels, usually emanating from a mountain or hill, and by exhausting the air, ready connection may be made with a fan of the form shown. The discharge is directly upward and the least liable to be affected by natural conditions. The Buffalo



BUFFALO STEEL PLATE VENTILATING FAN.

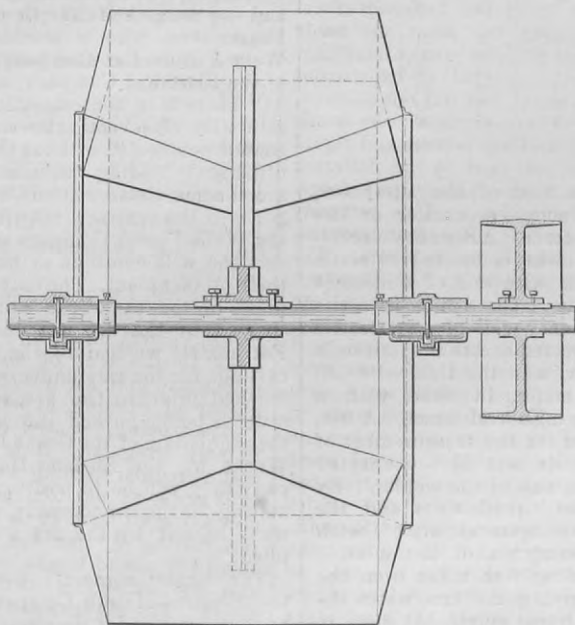


Fig. 2.—Section through Shaft and Bearings.

with Birmingham steel interests since their inception.

The new Italian battle ship "Sardegna," in her recent trials, is reported to have steamed 20 knots an hour under forced draft, attaining a higher rate of speed than any other war vessel of her class. The "Sardegna" is of 14,200 tonnage.

pany of Buffalo, N. Y. Two forms of spiders for the wheels are employed, viz: single and double; the former for average size fan wheels and the latter for greater diameters. These wheels are employed for ventilating and similar work where it is desired to handle a large volume of air at a moderate velocity, as a rule not exceeding 1 to 1½ ounces per square inch. As the ventilation of mines is commonly accom-

plished through long tunnels, usually emanating from a mountain or hill, and by exhausting the air, ready connection may be made with a fan of the form shown. The discharge is directly upward and the least liable to be affected by natural conditions. The Buffalo

How Agricultural Works are Run.

—An interesting statement is made by G. A. Stephens, vice president of the Moline Plow Company, Moline, Ill., with regard to the recent short-lived labor troubles in his works. The statement is addressed to a western paper and is as follows:

In your to-day's issue we note your conclusion of an item headed, "Moline Plow Plant Closes," to wit: "The company claim to be more than willing to shut down for two months or longer, as they are actually losing money." The company made no statement of this kind, because it is not the fact that they were or are losing money, but they did shut down in order to prevent a general strike. The goods which they are manufacturing now are for next spring's supply, the fall trade having been cared for. The output of goods which the company make is very large and of high quality; their manufacturing facilities are good; their credit and capital are ample, and their ability to buy their supplies is equally so; therefore, the trade conditions which pre-

vail next spring, and those only, can determine whether or not goods made at this time will have been made at a loss. It is true some labor difficulties exist and the company concluded it best to investigate them thoroughly, giving all dissatisfied parties a hearing rather than attempt to operate the plant under the circumstances.

Power Required in Electric Welding.

In a paper presented to the Institution of Mechanical Engineers of Manchester, England, by Benjamin A. Dobson, the author gives a valuable table, showing the horse-power required to electrically weld different materials of various sizes. He states that the practical every-day working for nearly three years of the process of welding by

confined to the welds required in every-day work, and have varied from 1/4-inch steel and iron to 2 inches, as shown in the table below. The measurement of the alternating current power supplied to the welding transformers is attended with some difficulty, owing to the short space of time during which the current and electromotive force are practically steady. As also every piece of iron varies in resistance, though cut from the same bar, the power registered is continually varying in the welding of bars of the same diameter. Another cause, accounting to some extent for the different powers obtained with the same size of shafting, is that the rheostat is not always worked from the same segment of the coils through the adding or deducting of the resistance, and consequently causes a greater or less exci-

trical horse-power given in the accompanying table is obtained from the true watts shown by the watt meter, divided by 746, and the loss in the mains and in the exciting current is got by calculation; the loss in friction is the amount of power required to work engine, alternator, and the exciter at no load.

Utilization of the Grant Locomotive Works.

The Siemens-Halske Company, whose great electric works at Chicago were burned on the 1st inst., have leased the plant of the defunct Grant Locomotive Works in that city at a rental of \$1000 per month. The day after the fire President O. W. Meysenburg of the Siemens-Halske Company began looking around for temporary quarters. The company had a large number of pressing orders on hand and it was decided to find a makeshift and to go ahead. President Meysenburg found in the plant of the Grant Locomotive Works the very thing he wanted. The machine shop and foundry have large electric traveling cranes which are absolutely necessary in handling the heavy machinery turned out by the Siemens-Halske Company. The foundry is of modern make and equipped with all the latest time and labor-saving devices, and the other shops are fitted up in like manner. The necessary machinery incidental to special work has been ordered to be delivered as quickly as possible, and when it is received work will be pushed night and day. The promptness of the company in securing the locomotive works enabled them to hold all orders.

In regard to a report in circulation to the effect that back of the lease made to the Siemens-Halske Company was a consolidation of the Grant Locomotive Works, the Wells-French Car Company and the Siemens-Halske Company, Mr. Meysenburg, who is president of the Wells French Car Company, as well as of the Electrical Company, said :

"There is in contemplation the consolidation of several interests, but this cannot be effected without the approval of persons holding large interests who are at some distance from Chicago. Reports to the contrary notwithstanding, the Wells-French Company are building cars and will continue to build cars at their present plant. The only part of the plant of the car works which was destroyed by the fire was the foundry. Fortunately we had all the wheels and castings for the cars under construction finished prior to the fire, so that the order is being pushed through. Since the acquisition of the Grant Locomotive Works by the Siemens-Halske Company they will be in position to do the casting for the car company, so that the want caused by the fire will be supplied."

The largest contracts now held by the Siemens-Halske Company are for huge generators for the electrical equipment of the West and North Chicago street car lines, for which the engines are being built by Fraser & Chalmers.

The city council of Morris, Ill., on the 11th inst., let contracts for a complete water works system to the Snyder-Williams Company of Dayton, Ohio, the Harvey Boiler Works, Harvey, Ill., and C. & T. Iglehart of Morgan Park, for a total of \$27 801.80. It is to be complete for use November 1. Whitmer & Vorhees of Buffalo, N. Y., have the supervision of the work.

Power Expended in Electric Welding.

Work welded.	Duration of current.	Watts 746	Loss in mains and in exciting.	Loss in friction.	Total.	Indicated horse-power.
	Seconds	E.H.P.	E.H.P.	E.H.P.	E.H.P.	
Wrought iron bar, 2-inch.....	243	59	10.8	18	87.8	.....
Wrought iron bar, 2 inch, polished.....	256	55	10.8	18	83.8	.....
Wrought iron bar, 2-inch, polished.....	255	59	10.8	18	87.8	88
Round iron bar, 1 1/8-inch—						
Average of 15 welds.....	57	17.7	6.3	18	42	42
Average of 7 welds.....	50	21	6.3	18	45 3	.. ..
Wrought iron steam pipe, 1-inch.....	67	20.1	6.8	18	44.9	.. ..
Wrought iron steam pipe, 1-inch.	66	19	6.8	18	43.8	.....
Wrought iron steam pipe, 1-inch.	61	24.7	6.8	18	49.5	.....
Wrought iron steam pipe, 1-inch.	86	15	6.8	18	39.8	49
Wrought iron steam pipe, 1-inch.	66 1/2	25.5	6.8	18	50.3	49
Bessemer steel shaft, 1-inch.....	64	22.3	8	18	48.3	.....
Bessemer steel shaft, 1-inch.....	65	22	8	18	48	.....
Bessemer steel shaft, 1-inch.....	62	23	8	18	49	49
Bessemer steel shaft, 1-inch.....	54	27.6	7	18	52 6	51
Bessemer steel, 3/4-inch.....	37	15.5	6	18	39.5	36.5
Bessemer steel, 3/4-inch.....	38	15.2	6	18	39 2	36.5
Bessemer steel, 3/4-inch.....	50	17	6	18	41	48
Bessemer steel, 3/4-inch.....	54	15	6	18	39	43
Bessemer steel, 1/2-inch.....	21	9.2	4.7	18	31.9	.....
Bessemer steel, 1/2-inch.....	21	10.1	4.7	18	32.8	.....
Bessemer steel, 1/2-inch.....	36	8	4.7	18	30.7	.....
Bessemer steel, 1/2-inch.....	22	10.3	4.7	18	34	.....
Bessemer steel, 1/2-inch.....	25	9.2	4.7	18	31.9	.....
Bessemer steel, 1/2-inch.....	30	8	4.7	18	30 7	34

electric force enables him to give certain indications and appreciations of this method considered as a practical workshop operation.

In common practice at the author's works the following materials have been heated and the undermentioned work has been performed. Welding of steel of every quality, iron of every description from crown to best roller iron and charcoal iron, steel and iron together, wrought iron and cast iron; different diameters of the same and different materials. Riveting in many varieties—work which previously had to be riveted cold, and which consequently left the strength of the parts uncertain—is now done easily and certainly with the requisite heat. The piecing of countershaft and lathe spindles, where the question of exactness of length is of the utmost importance; screwing taps, rollers and spindles broken in the neck bearings, and brazing of all descriptions, have all been successfully treated. The alloys which have been tried have been done more for the purpose of experiment than for any useful end, and were not successful, owing to there not having been time to persevere sufficiently for ascertaining the precise temperatures and conditions under which the process could succeed.

The tests to discover the power required for electric welding have been

tation of the field of the alternator, thereby producing a greater or less electromotive force. A Siemens electro-dynamometer was connected in series with the thick wire coil of a Siemens watt meter, the latter being in series with the primary coil of the electric welder. Connected across the terminals of the welder was the thin wire coil of the watt meter, in series with a non-inductive high resistance. A Siemens voltmeter for the measurement of alternating volts was also connected across the terminals of the welder. By this means the virtual volts and the virtual amperes were estimated with sufficient accuracy; and at the same moment a reading was taken from the watt meter, giving the true watts absorbed in the transformer. At the time of taking the instrument readings, indicator diagrams were taken from the engine, which afford a considerable check on the results obtained from the watt meter. In order to estimate accurately the power taken for each weld, it is necessary to add the power required to excite the alternator, and the power lost in transmission. For this purpose the resistance was measured of the mains supplying the current to the primary coil of the welder, and also of the resistance of the mains carrying the exciting current; the former was 0.2 ohm, and the latter 2.6 ohms. The elec-

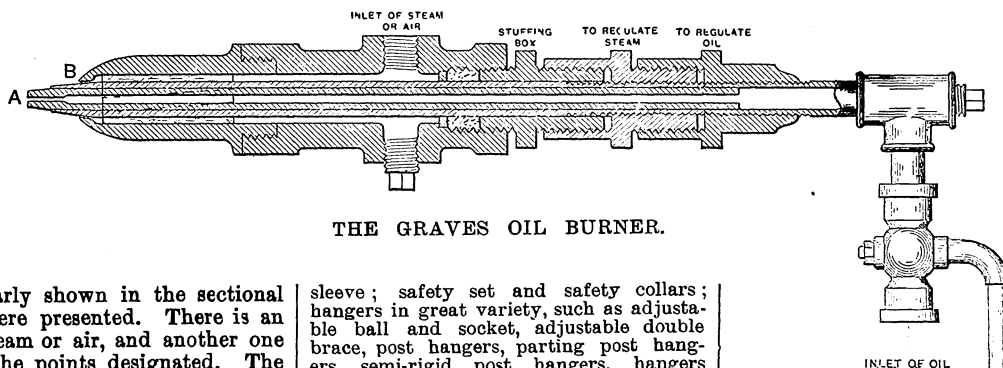
The Cold Bend Test.

At the Brooklyn meeting of the American Association for the Advancement of Science Mansfield Merriman, in his vice-presidential address on "The Resistance of Materials Under Impact," made the following remark:

During all this development of static testing one impact test has survived and everywhere held its own. This is the cold bend test for wrought iron and steel. In the rolling mill it is used to judge of the purity and quality of the muck bar; in the steel mill it serves to classify and grade the material almost as well as chemical analysis can do, and in the purchase of shape iron it affords a quick and reliable method of estimating toughness, ductility, strength and resilience. It is true that numerical values of these qualities are not obtained, but the indications are so valuable that if all tests except one were to be abandoned, the simple cold bend test would probably be the one which the majority of engineers would desire to retain.

The Graves Oil Burner.

The construction of the Graves patent oil burner, made by the Hydraulic Press Brick Company of St. Louis,



THE GRAVES OIL BURNER.

Mo., is clearly shown in the sectional drawing here presented. There is an inlet for steam or air, and another one for oil, at the points designated. The oil passes through the center of the burner and issues at A, the steam or air issuing from the orifice B. Threaded sleeves are provided, as shown, for regulating the steam and oil flowing from the burner. A stop cock regulates the flow of oil to the machine, and there is a similar stop cock in the steam pipe which controls the pressure of the steam or air. If the flame desired is to be close to the burner a low pressure of steam is admitted and the oil pipe drawn in. If the flame is to be some distance away a heavier pressure of steam is applied and the oil pipe extended. This burner has been thoroughly tested at the different plants of the manufacturers and has been found to be reliable and satisfactory in its operation.

The South has of late been happy in comparative exemption from strikes and labor troubles generally. While business has been at a standstill at a hundred different points in the North, says the *St. Louis Republic*, the wheels of industry and commerce have been running almost everywhere south of Mason and Dixon's line. More new industrial establishments have been set on foot within the last three months in the South than were started there in any other quarter since 1892. The number reported is 787, against 662 for the preceding quarter and 436 for the last quarter of 1893. This record has been beaten only two or three times in the whole history of the South.

Trade Publications.

RICE MACHINERY COMPANY, 166 to 174 South Clinton street, Chicago, and 93 West Water street, Milwaukee, have just issued a catalogue of Appliances for the Transmission of Power, which they claim to be the most comprehensive thus far produced on this subject. It consists of 200 pages, and the compilers have endeavored to include in it everything necessary to a complete line of power transmission machinery. In an introductory note the company state that this department of engineering has become a distinct field, and is now carefully considered in designing manufacturing plants. They have expended many thousands of dollars in designing new patterns and originating labor saving and economical appliances for the efficient transmission of power, reducing first cost, running expenses and renewals to a minimum. They are general agents for Dodge Mfg. Company's specialties, which are fully illustrated in this catalogue. A description is given of the power distributing plant of Dodge Mfg. Company's works at Mishawaka, Ind., which is an interesting example of rope transmission on a large scale. Much space is given to pulleys, the merits of the Dodge patent Independence wood split pulley being thoroughly set forth, and complete price-lists given. Shafting receives some attention, price-lists being published of patent turned steel shafting and cold rolled or die drawn. Then follow couplings, safety compression, ribbed compression, clamp, flange and solid

THE JOHN F. BYERS MACHINE COMPANY of Ravenna, Ohio, have issued a catalogue describing their hoisting engines and boilers. These engines are all of the upright pattern. The cylinder, steam chest, guides and crank shaft hearings are all in one piece and cannot get out of line. The piston is fitted with a self-adjusting packing ring and the crosshead gibs travel in broad bearings. The connecting rod is fitted with adjustable gun metal boxes, filled with aluminum copper anti friction metal at one end, and improved conical bearing for taking up all wear and preventing lost motion. The boilers are made of open hearth flange steel plate, having a tensile strength of 60,000 pounds, an elastic limit of 30,000 pounds, an elongation of over 20 per cent. and a reduction of area of 40 to 50 per cent. Every boiler is tested to 160 pounds cold water pressure and is fired up and all hoisting engines complete are run under steam pressure and thoroughly tested before leaving the works.

WE HAVE RECEIVED a pamphlet describing the high grade horizontal and vertical steam engines and steel boilers made by James Leffel & Co. of Springfield, Ohio, and New York. These engines and boilers are the result of more than 30 years' continuous practical experience in this particular line. They are of excellent design and well built of the best materials.

WE HAVE RECEIVED from the Smith-Courtney Company of Richmond, Va., a catalogue of their supplies and machinery for railroads, contractors, machinists,

sleeve; safety set and safety collars; hangers in great variety, such as adjustable ball and socket, adjustable double brace, post hangers, parting post hangers, semi-rigid post hangers, hangers with chain oiling bearings; ball and socket pillow blocks, chain oiling pillow blocks, rigid pillow blocks; journal bearings, adjustable step bearings; girder clamps, guide pulleys, base plates for pillow blocks, &c.; oil indicators, the Positive lubricator, grease cups and the Dodge self oiling device for hangers, pillow blocks, &c. Jaw and friction clutches and their auxiliary machinery receive much attention. The Dodge patent American system of rope transmission is illustrated by a large number of diagrams, which include the special devices which have been invented in connection with it. Sprocket wheels for chain belting and detachable chain belting are comprehensively treated. Full price-lists are given of finished iron pulleys, leather belting and rubber belting, together with complete tables of dimensions for couplings, hangers, pillow blocks, friction clutches, &c.

DIRECT ELECTRIC ELEVATORS for passengers and freight are described in a circular by the Central Machine & Foundry Company of Quincy, Ill. A catalogue from the same company describes hydraulic, steam, belt and hand power elevators for passenger and freight service.

THE CATALOGUE of the Smith-Hill Elevator Company of Quincy, Ill., describes their passenger and freight elevators operated by steam, gas, electric or belt power.

AN ILLUSTRATED CATALOGUE of the Sebastian Lathe Company of Cincinnati, manufacturers of engine and speed lathes, has been received. The description covers speed and engine lathes of various sizes, emery grinders, upright drills, shapers, planers, &c.

THE NATIONAL PIPE BENDING COMPANY of New Haven, Conn., have published pamphlets which describe their national feed water heater and contain the long list of buyers and users of these heaters.

miners, mills, &c. This company are the Southern selling agents for many of the best known manufacturers of machinery and supplies of every description. Some idea of the scope of this catalogue, which is a large, handsomely bound volume of 527 pages, may be formed from the following incomplete list of what we may term general headings: Cast and malleable iron fittings; pipe fitters' tools; pipe threading and cutting machines; valves and cocks; hydrants; engine and boiler trimmings; steam pumps; belting, hose and packing; heating and ventilating apparatus; taps, dies and drills; indicators; lathe chucks; blowers and forges; drills; machinist, blacksmith and molders' tools; saw mills; rock drills; steam engines and boilers; shafting, pulleys and hangers; machine and wood working tools, &c.

A CATALOGUE AND STEAM USERS' MANUAL has been published by the Star Brass Mfg. Company of Boston, Mass. Aside from its being a catalogue and price-list of steam gauges, Pop safety valves and other steam specialties, many pages are devoted to useful information on physical and mechanical elements, constructions and results. The value of such a publication as a reference book for engineers and steam users will be readily appreciated, and it will serve as an excellent compendium for every day use. The Edward Longstreth medal of merit has just been awarded to this company by the Franklin Institute for their Star steam gauge.

THE JULY ISSUE of "Modern Turret Lathe Practice," issued by the Gisholt Machine Company of Madison, Wis., contains illustrations of some of the uses of their 24-inch monitor lathes, 28-inch standard lathes with rotating chuck, 24-inch lathes for pulley and gear turning, and turning change wheels.

The Maxim Flying Machine.

From our contemporaries the *London Engineer* and *Engineering* we take the following account and drawings of the recent flight of the flying machine devised by Hiram S. Maxim. From our last named contemporary we take the following general description:

The Maxim flying machine is a large braced structure formed of steel tubes and wires, and is exceedingly stiff for its weight, which is about 8000 pounds,

steam is generated. The feed pumps are placed on the deck beneath the engines, and are of variable stroke, so as to be adapted to the needs of the boiler. As they work at high speed, the valves are of large diameter—larger than that of the plungers. Pounding is prevented by a rubber bag on the suction, and spring pistons on the discharge. The total quantity of water in the boiler only amounts to 200 pounds, so that it is necessary that the amount of feed should be accurately adjusted. There is a very ingenious

shows itself on a gauge attached to the pipe. By this most ingenious device an open faced pressure gauge is substituted for the usual gauge glasses. The weight of the boiler with casing, feed water heater, dome and uptake, is 904 pounds; with burner and water it is 1200 pounds. The heating surface is about 800 square feet and the flame surface 30 square feet.

The fuel burned in the boiler is gasoline, of a specific gravity of 72 Beaumé. It is carried in a copper vessel on deck, and is pumped through a vaporizer into

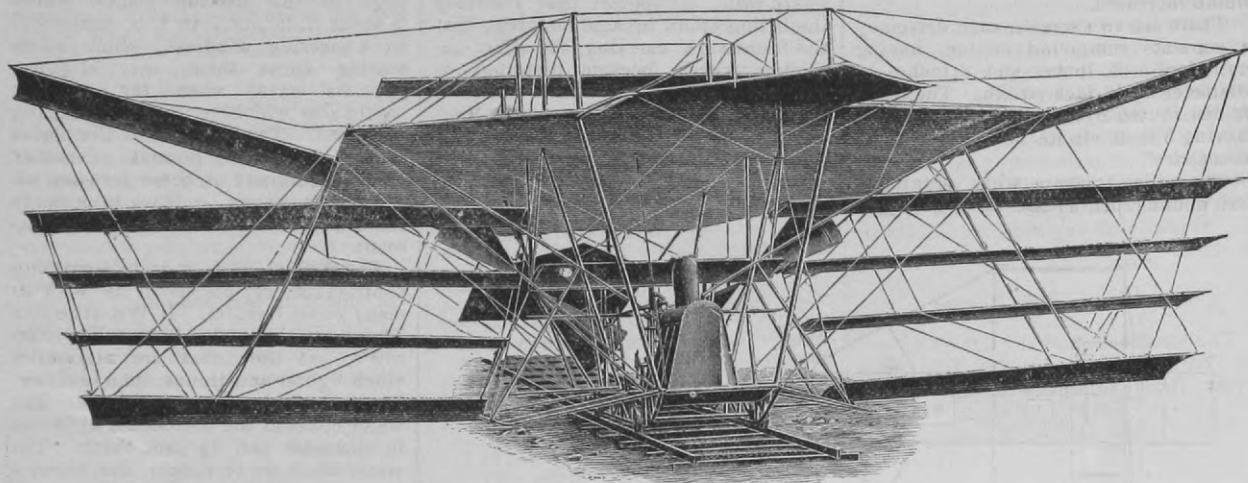


Fig. 1.—Perspective View of the Machine.

including men and stores. At its lower part it carries a deck on which the crew stand, where also the boiler, steering wheel and reservoirs of water and gasoline are mounted. At a height of some 10 feet above the deck come the engines, each of which drives a screw propeller of 17 feet 10 inches diameter and 16 feet pitch, working in air. Above the propellers is the great *aéroplane*. Smaller *aéroplanes* project out, like wings, at the sides, the extreme width being 125 feet, and the length 104 feet. There are five pairs of wings, as shown in the illustration, Fig. 1, but the intermediate three pairs are not always used, and at the time of the accident these were not in place. At that time the area of the *aéroplanes* was 4000 square feet. With all the planes in position the total area is 5400 square feet. Forward and aft of the great plane are two steering planes carried on trunnions at the sides, and connected by wire strands with a drum on the deck. By turning this drum the steering planes can be simultaneously tilted to direct the machine upward or downward, or to keep it on an even keel.

The chief interest centers on the boiler, Fig. 2, as unless this be made exceedingly light it is hopeless to expect that the machine will soar. The casing is made of straight tubes. In the boiler of the flying machine a feed heater is placed over the steam drum. The feed heater is constructed of steel tubes $\frac{3}{16}$ -inch bore and $\frac{1}{2}$ -inch thick; the water is pumped through it at a pressure 30 pounds higher than the pressure in the boiler, and is delivered through an injector like nozzle into the top of the downcomer pipe. The incoming water delivers its surplus energy to the surrounding liquid, creating a rapid and powerful current in the pipe, and consequently maintaining an active circulation in the small tubes in which the

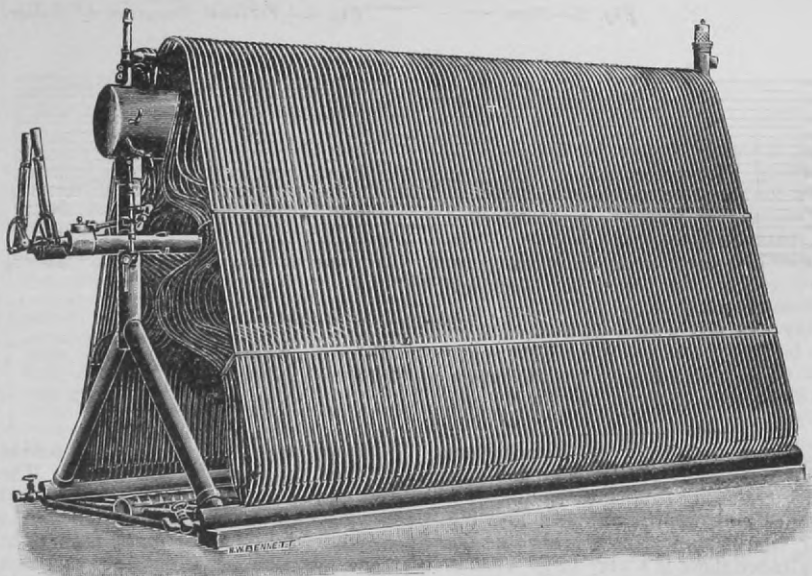


Fig. 2.—The Boiler.

THE MAXIM FLYING MACHINE.

water level indicator. A small pipe is led in a loop from front to back and from back to front of the furnace. It is then taken to the steam and water drum and led backward and forward through that in the same way below the water line. The whole is filled with water, and forms a closed circuit having two loops—one in the furnace and one in the water. Now, so long as the upper loop is in the water the pressure does not rise greatly beyond that in the boiler, because the heat taken up in the furnace is conveyed by the circulation to the water in the drum. But if the water level falls in the drum, then there is no outlet for the heat; the pressure consequently rises most rapidly, and

the furnace. The pipe from the pump is led into a vessel having a large gasoline burner beneath it. In this vessel the spirit attains a pressure of 50 pounds on the square inch, and a corresponding temperature, in which condition it is, of course, highly inflammable. The gas which it gives off is conducted by a pipe passing through the furnace to a jet, like that of a Bunsen burner, at the front of the furnace, and in rushing through it induces a powerful draft of air, with which it mixes. The combined charge passes through hollow fire bars, pierced on the upper surfaces with fine holes, and burns in 7650 separate flames. The arrangement is so powerful that the

pressure in the boiler can be raised from 100 pounds to 200 pounds in a minute. The air supply can be regulated at will, while the expenditure of gasoline automatically adapts itself to the needs of the boiler. The pressure of the gasoline vapor acts on a lever, which is balanced by a spring. If the feed is greater than the consumption the pressure on the lever puts a pawl in gear with a ratchet wheel, and through intermediate mechanism works a block along a slotted arm to reduce the throw of the gasoline feed pumps. If the feed is too small the opposite effect is produced and the throw of the pump increased.

There are two screws, each driven by a separate compound engine, having cylinders 5.05 inches and 8 inches in diameter by 12-inch stroke. The steam is distributed by means of piston valves having 3-inch stroke and operated by eccentricity.

The boiler pressure when running is 320 pounds per square inch, giving in

Mr. Maxim's endeavors to propel a machine through the air is so marked that we think a description of this most remarkable contrivance will not just at present be out of place. It is not to be supposed for a moment that this machine approaches anything like perfection, but there can be no doubt that its performances considerably eclipse all previous efforts.

This is what happened on the occasion of the flight of the machine:

The machine had traveled some 1000 feet, the latter 550 feet of which it had flown, a fact which is clearly proved by the impressions made on the inverted guard rails. It appears that suddenly the lifting effort became so great that the framework carrying the after retaining wheels became distorted to such a degree that the wheels ceased to perform their office, and the after part of the machine became free—the forepart, however, continuing to hold the machine down, but not for long, as the wobbling which ensued rendered

commenced to soar, and *w w w w* are those which were supposed to retain the machine by reason of the inverted rail above them. This they failed to do, owing to the too slender construction of the framing in their vicinity.

Above all this there is the great central *ærop'ane*, with a surface of some 1400 square feet. This, with the side wings and the steering planes fore and aft, all taken together, have a total area of 5400 square feet. At the time of the trial the area was 4000 square feet, as six of the side planes were found unnecessary. The total width is 104 feet, and the length 125 feet. The angle of the steering planes, which is about 7.25° , or 1 in 8, is controlled by a steering windlass, which when soaring turns them, very slightly, opposite ways, when the machine would soar whichever way it was being propelled. The total lift of the planes amount to 10,000 pounds. Another valuable property of these fore-and-aft *æroplanes* is their tendency to preserve the equilibrium of the machine in descent.

The boiler, Fig. 2, is a fascinating contrivance, replete as it is with so many novel features. It is a little like Thornycroft's, and a little like Yarrow's, but the tubes are necessarily much lighter and thinner than in either. Their shape is shown in Fig. 4. The water boxes at the bottom are $2\frac{1}{2}$ inches in diameter and $\frac{1}{4}$ mm. thick. The water tubes are of copper and about $\frac{1}{4}$ inch thick. The Y downtake is 3 inches in diameter. There is a forced circulation maintained by an injector in the upper leg of the inverted Y. This may be briefly explained as follows: Water is pumped into the boiler at 330 pounds to the square inch. This escapes into the boiler through an injector nozzle, and as the steam pressure usually required is 300 pounds, it follows that there are 30 pounds devoted to this circulation. The cold water coming in combines with the hot water, increasing the gravity of the water in the downtake, and down it goes, so that the water coming in is immediately taken to the hot tubes. The nozzle is provided with a spring which always maintains the 30 pounds difference in pressure. A very convenient apparatus is attached to the feed pipe, by which it is possible to see at a glance exactly how many pounds of water per hour are entering the boiler.

Over the upper part of the boiler there is a second system of smaller tubes, also of copper, $\frac{1}{8}$ inch diameter and $\frac{1}{16}$ inch thick, constituting the feed water heater, which raises the temperature of the water to 250° F. In this way the products of combustion, having passed between the boiler tubes, are brought into contact with the incoming water before escaping.

The boiler will and does make more steam than can be used. Its weight, with its feed water heater, casing, uptake, furnace and water, is 1200 pounds, 200 pounds being that of the water itself. The fuel employed is naphtha of 72° Beaumé. This is heated in the gasoline boiler by a part of its own contents, and delivered to 7650 jets at a pressure of 50 pounds per square inch. The average contents of this boiler is about 40 pounds.

The gas, when generated, passes through the furnace and then out at the other end of the steam boiler. It then enters the burner through an injector, and the fall in pressure from 50 pounds per square inch to 1 pound per square inch is made to do work in sucking in air. A damper shaped valve may be

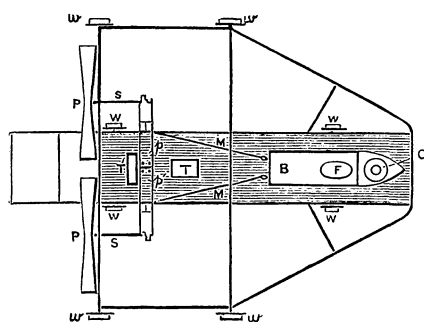


Fig. 3.—Plan.

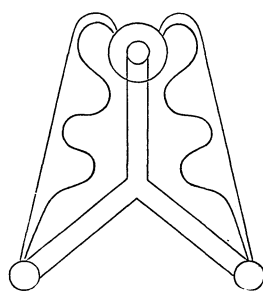


Fig. 4.—Vertical Diagram of Boiler.

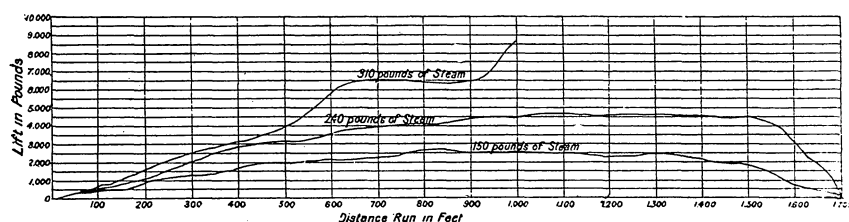


Fig. 5.—Diagram of Flight.

THE MAXIM FLYING MACHINE.

the high pressure cylinder a differential pressure of 195 pounds, and in the low pressure cylinder 125 pounds. The cut offs are respectively 0.75 and 0.625 of the strokes. In the high pressure cylinder there is a very large clearance designed to prevent injury from water in case the machine should pitch. The actual horse-power delivered to the screws is 363, when the engines are running at 375 revolutions per minute. Of this we (*Engineering*) are informed by Mr. Maxim, 150 horse-power are expended in slip, 133 horse-power in actual lift on *æroplanes*, and 80 horse-power in driving the machine, with its frames and wires, through the air. The thrust of the screws when the machine is moored is 2100 pounds, and when it is running it is 2000 pounds. We give these figures as they were supplied to us, omitting decimals. The total lift is something over 10,000 pounds, at a speed of 40 miles an hour, and with the *æroplanes* making an angle of about 7.25° with the horizontal.

From the *Engineer* we take the following and also engravings 3, 4, 5. The success which recently attended

steering impossible, and the machine got out of line with the track. The left hand front wheel also got free, and the machine charged against one of the timber supports carrying the right hand guard rail, tore up the rail, which is simply a 9×3 -inch plank, and did very great damage to its own frame work. The ride was in this way brought to a sudden stop, and it will be several months before it can be renewed. The total weight of the machine, including 600 pounds of water, 200 pounds of naphtha and three men, was about 8000 pounds.

Fig. 3 shows the deck plan of the machine. P P are the two propellers mounted on the shafts S S, to each of which motion is given by a compound steam engine. B is the main boiler, delivering steam through the pipes M M. G is the gasoline boiler, which is kept charged with about 40 pounds of naphtha by a pump, *p'*, automatically regulated, the supply being contained in the tank T', while the larger tank, T, contains the feed water, which is fed into the boiler by the feed pumps *p*. W W W W are the wheels which run on the track before the machine has

turned about so as to vary the air at will—full on blows the gas out, while with it closed a great cloud of black smoke is given off at the smoke stack. With a proper adjustment the flame is a purple white and about 22 inches high.

The engines weigh 600 pounds, so that Mr. Maxim obtains more than 1 horse-power for every 2 pounds of weight—which is in itself an achievement. The pumps weigh 100 pounds; the high pressure pistons are 5.05 inches in diameter; the low pressure 8 inches in diameter by 1-foot stroke. The high pressure cut off is at 0.75 of the stroke, that of the low pressure being at 0.625. The relatively high pressure in the low pressure cylinder is due to its earlier cut off, and to a large clearance in the high pressure cylinder which is allowed in order to protect the cylinder from injury by water in case the machine should pitch. The ports and steam passages are unusually large. The engines move with very little friction, owing to their exceeding lightness. The piston speed is estimated at 750 feet per minute.

An instance of the great care and forethought with which the engines have been planned lies in the construction of the big ends of the connecting rods. The bolts which secure the brasses are hinged on the end of the rod in such a way as to allow of any slight bending, in the event of the strain on the frame work of the machine bringing the crank out of line with the cylinder. It must be remembered that the engine, cylinders, frame and rods are entirely made from sheet metal, so that there is every possibility of there being necessity for some such safeguard as this. By-pass valves are provided, so as to allow live steam to pass directly to the low pressure cylinders; thus if the steam pressure in the boiler should mount too high it will blow past the high pressure cylinders, instead of blowing off into the air, and the fall in pressure is made to do work in the exhaust from the high pressure cylinders, drawing the steam from the high pressure and driving it into the low pressure, thus causing more direct pressure on the low pressure than back pressure on the high pressure. In this way the engines may be made to develop fully 400 horse power.

The diagram given in Fig. 5 shows what occurred on the day of the disaster. The ordinates show the lifting effort in pounds, the abscissæ the distance in feet traveled. It will be seen that the dynograph ceased to record after a distance of 1000 feet had been covered. In other words—this was the point when the crash came.

All the frame work of this extraordinary machine is composed of hollow tubes. The exhaust from the main engines is conducted through them out at the back of the main aeroplane, in order that the steam may not injure the canvas. The condenser is not yet a perfected detail. It is a luxury, and not essential to the flying properties of the machine. It is, of course, receiving Mr. Maxim's attention. The horizontal angle of incidence in flight is to be maintained by a "gyrostat," which consists of a gyroscopic wheel, rotating, suspended by universal joints, and connected with the two horizontal aeroplane rudders, so as to act upon them instantly—through the well-known property of the gyroscope to continue rotating in the same plane—in case there is any tendency of the machine to deviate from the angle of incidence. The whole of the apparatus is stayed by diagonal wire ties.

In conclusion the *Engineer* states: What Mr. Maxim has done has been to, so to speak, make a bird that does not know how to fly. We believe that the safe use of such a machine will always depend on the skill of the driver. Because we put on skates we do not expect to be able to skate right away. No more can we expect Mr. Maxim to be able to control this machine efficiently until he has had years of practice. In the same way there are birds who fly well and birds who fly badly. This bird has only just been hatched. Let us hope that Mr. Maxim will not come to grief, "Icarus like," before he is fully fledged.

Electricity in Mines.

From a paper by W. E. Lishman in the *Journal* of the British Society of Mining Students, on "Electricity in Mines" we take the following conclusions:

It seems probable that in the future the alternate current will be more extensively used, the obstacle at present in the way being the difficulty there is in starting the motors. Economy in transmission will be further increased by the introduction (with sufficient precautions) of high tension currents and the use of transformers, which in some cases are already employed. The current is taken along the main cables at a high potential, and at the required points is transformed into one of low potential and large current. In every machine which is used for the purpose of converting energy in one form into energy in another more adapted for service, the transformed energy, or the energy realized, is never so great as that originally given out; and since, by the doctrine of "conservation of energy," none is ever lost, but only reappears in some other form, the difference between the energy employed and that realized is either expended in doing work in the process of conversion or dissipated in some other form, owing to the want of proper means of concentrating it into the desired channel. This loss (loss so far as the desired end is concerned) must exist so long as there is work to be done in the process of conversion, but it can be reduced to a minimum, and the nearer the realized energy approaches that originally given out the more efficient is the process. Friction, in ordinary machines, is accountable for absorbing much of the power, but with electricity, as seen above, there are other losses, and a more ready way of obtaining the current is to be looked for in the future. When heat, which is so readily obtained from electricity, can be as readily reconverted into electricity without the introduction of all the machinery at present necessary, and the friction consequent upon it, economy will be still further increased and efficiency will approach a maximum. At present this is in its experimental stage, but there seems ground for believing that it will eventually become practicable.

It may be of considerable interest to our readers to note that the recent request for information regarding manufacturers of annealed gray iron castings brought responses showing that such castings are made by the following establishments: Franklin E. Huntress & Co., 8 Oliver street, Boston, Mass.; Malleable Iron Works, New Britain, Conn.; the Turner & Seymour Mfg. Company, Torrington, Conn.; the Stuart & Peterson Company, Burling-

ton, N. J.; the Taylor & Boggis Foundry Company, 523 Seneca street, Cleveland, Ohio; Carondelet Foundry Company, 2123 S. King's Highway, St. Louis, Mo.; Western Malleable & Gray Iron Mfg. Company, Port Washington, Wis.

The New American Atlantic Liners.

The steamers "St. Louis" and "St. Paul," now building by the Cramps for the International Navigation Company, are the largest vessels ever constructed in America, their dimensions being: Length over all, 554 feet; length on load water line, 536 feet; extreme breadth, 63 feet; molded depth, 42 feet; tonnage, 11,000. Each boat will be propelled by twin screws, each driven by a quadruple expansion engine having cylinders 36, 50, 71 and 100 inches in diameter and stroke of 60 inches. They will develop about 10,000 indicated horse power each. Steam at 200 pounds pressure will be provided by six steel double ended boilers each 20 feet long and 15 feet 7½ inches in diameter. The battery will have 48 Purves furnaces 39 inches in diameter and will be fitted with Servé's tubes. The total grate surface will be 830 square feet and the heating surface 30,000 square feet. The vessels must be easily capable of maintaining a speed of 20 knots an hour at sea. In the design provision has been made so as to easily and readily convert the boat into armored cruisers, if necessary.

A notable shipment of shafting and pulleys was recently made by the Rice Machinery Company, 166 to 174 South Clinton street, Chicago. It was consigned to the Northwestern Coal Railway Company, Superior, Wis., for use on their coal dock. The items of the shipment are as follows: One piece of 5½ inch shafting, 7 feet long; one 5½ inch, 17 feet long; six 4½ inch, 24 feet long; eleven 4½ inch, 24 feet; six 4½ inch, 24 feet; four 4-inch, 24 feet; four 3½ inch, 24 feet; four 3½ inch, 24 feet; four 3-inch, 24 feet; 47 pairs of flange couplings; 40 friction spools, 22 x 15, and 40 friction spools, 15 x 12. All are to be coupled in one continuous line 1250 feet long, driven at one end by a 500 horse-power rope drive. The equipment comprises two 500 horse-power engines, so that one can be held in reserve or both be used if occasion requires. The shipment required four cars and comprised a total of 175,000 pounds. One gondola car was loaded with 47,110 pounds.

Excavation has been begun for the power house of the Metropolitan West Side Elevated on its line between Throop and Loomis streets, Chicago. The building will be 600 feet long, 90 feet wide, and have an average height of 70 feet. Only one-half of this, however, will be put up at the present time, the other being added as the extension of the company lines demands an increase of power. It will be of steel construction, with red brick walls and slate roof, and will be fire proof. The plans are to make it the model power station of the country. The cost will be \$300,000, and it will be completed December 1. The engine room, which will be 300 feet long, will afford space for eight engines, each capable of producing 2000 horse-power in electrical current. The battery of boilers will be in a separate house and will consist of 36 boilers of 300 horse-power each.

Washington News.

(From our Special Correspondent.)

WASHINGTON, D. C., August 22, 1894.

The Machine Gun Trials.

Upon the recommendation of Commodore Sampson, Chief of the Bureau of Ordnance, United States Navy Department, the Secretary of the Navy has authorized the invitation of the Gatling gun and the Maxim-Nordenfeldt companies to manufacture respectively one gun each of caliber 6 mm. to be tested in comparison. As the character of the ammunition influences in a very important way the efficiency of a gun, in order to enable the Board to reach a conclusion which gun is best for the navy it is thought advisable to compare these guns with the ammunition they will use in service. The Driggs-Schroeder firm, who are agents for the Accles gun, have requested permission to make an improved gun of 6 mm. caliber and present it for trial.

The Bureau has recommended that all competitors in the late trial be allowed to present guns of 6 mm. caliber if they desire. In every case the ammunition to be used will be furnished by the Government. The object of this is that all shall use absolutely the same kind of ammunition. It is expected that several months will be required to prepare for this test.

The following is a synopsis of the majority and minority reports on the trial of machine guns, under order July 5, 1894, begun July 6 and continued till August 4, 1894 :

The majority report is signed by Philip R. Alger, professor U. S. N., and A. C. Diffenback, Ensign U. S. N.

Six guns were submitted, viz : Gatling, Accles, Gardner, Robertson, actuated by hand cranks and of multi-barrel system ; Maxim-Nordenfeldt Skoda, automatic and single barreled.

The Robertson gun was withdrawn permanently during the progress of test and the Gatling and Accles were both temporarily withdrawn. The tests were made at the Washington Navy Yard and Naval Proving Ground.

The range was 25 yards, at the navy yard, the merit of each gun considered under the following heads : 1, Certainty of fire, ammunition supposed to be efficient ; 2, simplicity of mechanism and its liability to get out of order in service ; 3, accuracy and facility of aimed fire ; 4, rate of fire ; 5, weight of gun ; 6, method of feed and ammunition supply ; 7, ease and convenience of manipulation ; 8, crew required.

Relative value of the above features, the final order of merit, is submitted as follows :

Maxim-Nordenfeldt [Maxim is an American inventor], Gatling, Accles, Skoda, Robertson, Gardner.

Taking up the guns in the inverse order of merit as above determined the advantages and disadvantages of the various systems are as follows :

Gardner.—Disadvantages : 1, Low speed of fire in proportion to weight ; 2, great derangement of aim by the effort on the crank and its location ; 3, liability to damage through hang fires ; 4, gravity feed and frequent jams of feed ; 5, insufficient power of extraction and play of extractor, permitting slipping off rim of cartridge, causing failure to extract and loss of several unfired cartridges each time the gun is cleared ; 6, intermittent fire ; 7, unserviceable character of charger, due to

instability and liability to damage from weather and transportation ; 8, number of men required in crew.

Advantages : 1, Simplicity of mechanism ; 2, comparatively light weight.

Robertson.—Disadvantages : 1, Insufficient support of cartridge at the chamber, due to the design of feed wheel and belt, causing ruptured cases and jams ; 2, derangement of arm by crank effort ; 3, liability of feed belt to jam through, bending or displacement of links ; 4, lack of facility of slowness of ammunition, due to design of feed belt ; 5, liability to damage by hang fires.

Advantages : 1, Lightness and consequent mobility ; 2, shock of recoil not communicated to mechanism, but taken on frame ; 3, simplicity of mechanism.

Skoda (Austrian).—Disadvantages : 1, Gravity feed and consequent interruptions, jams and liability to premature explosions ; 2, failure to work automatically unless the cartridges and chamber are lubricated ; 3, complexity of mechanism ; 4, small range of working limits with diminished pressures, due to deteriorated ammunition ; 5, slight derangement of aim due to pressure required to overcome spring on charger in feeding ; 6, weight and cumbersome character of chargers ; 7, liability to temporary inaction from damage to single barrel ; 8, impracticable cooling device for barrel.

Advantages : 1, Lightness and consequent mobility ; 2, freedom from damage due to hang fires ; 3, great directive facility, due to absence of disturbing influence of crank effort ; 4, two men only required in crew.

Accles.—Disadvantages : 1, Great weight, making the gun inconvenient for boat or landing purposes ; 2, derangement of aim by pressure required on charger to overcome spring of lever which throws feed mechanism in action ; 3, liability to hang fires ; 4, very small actual volume of fire in proportion to number of barrels and weight, due to gearing down of crank at trunnions, crank effort and intermittent character of fire ; 5, complicated, heavy and cumbersome feed mechanism and its liability to jam by loose cartridges and also the time, effort and skill required to clean ; 6, unsuitability for service use of chargers for the reason that if the charger becomes bent or wet its rigidity is destroyed and the cartridges lost through inability to use in the guns ; 7, intermittent fire and large intervals between the fire of chargers ; 8, number of men required in the crew.

Advantages : 1, Capability of use with any number of barrels less than the full number, in case of damage to barrel or lock but with the probability of a jam if fired at depression under these circumstances ; 2, adaptability to motor power ; 3, familiarity of the service with this type of mechanism.

Gatling.—Disadvantages : 1, Great weight, making the gun inconvenient for boat or landing purposes ; 2, great derangement of aim by the effort on the crank and the location of the latter ; 3, liability to damage by hang fires ; 4, small actual volume of fire in proportion to number of barrels and weight, due to crank effort and intermittent character of fire ; 5, liability of cartridges in feed strip being displaced, causing a jam ; 6, intermittent fire ; 7, Number of men required in crew.

Advantages : 1, Simplicity of charger and hopper, making the clearing of jams easy and rapid ; 2, capability of use with any number of barrels less than

the full number in case of disabling lock or barrel, but with a probability of jam if fired with depression under these circumstances ; 3, familiarity of the service with this type of mechanism ; 4, adaptability of motor power.

Maxim.—Disadvantages : 1, Complexity of mechanism ; 2, liability to temporary inaction due to damage to single barrel ; 3, necessity of renewal of water supply in jacket after continuous firing of about 2000 rounds and from leakage.

Advantages : 1, Lightness and consequent mobility ; 2, freedom from damage due to hand fires ; 3, great directive faculty due to absence of crank effort ; 4, small crew required ; 5, continuity of fire ; 6, facility of packing and stability of cartridges due to design of feed belt.

The majority concludes that the efficiency of an automatic machine gun is so much greater than a gun worked by hand that nothing but a strong presumption that they will not remain efficient in actual service can justify the adoption of the inferior, but less complicated gun. Regard was given to the greater skill required to operate the mechanism of an automatic gun. The Board concludes that too much would be sacrificed to fear of lack of skill if the great advantages of the automatic system were put aside.

"That the Maxim-Nordenfeldt proved itself greatly superior to all others submitted, the only hitches in the trial being attributed to defects in ammunition. These are found in all guns, and are remediable." This gun has seen actual service since 1888, and was officially adopted in the German navy. The Board determined to recommend the consideration of two systems, one for use on shipboard and one for landing purposes.

The increase in volume of fire of the Gatling and Accles guns over the Maxim-Nordenfeldt proved so slight that the simplicity due to the use as a single barrel outweighed that slight advantage.

"The Board, therefore, recommends the adoption of the Maxim-Nordenfeldt gun, and that all machine guns for the naval service be of this type contingent upon the successful test of a gun of 6 mm. caliber."

The Minority Report.

The minority report of the trial of machine guns, signed by C. S. Sperry, Commander, U. S. N., senior member, dissents from the recommendation of the Maxim-Nordenfeldt. It states the technical difference between guns of first-class requiring hand or motor power for loading, firing and extracting, and the second class, or automatic guns utilizing force generated by the explosion of the charge to continue the operations of loading, firing and extracting after the first round has been fired by hand. The report agrees with the board in placing the Gatling first among guns of its class. With this gun in the beginning the tin charger strips were defective, causing jams. They were remedied. The firing of the Maxim was frequently interrupted by the transverse rupture of the cartridge shell. In the final test, the minority declares, with an inexperienced crew 1200 rounds were fired ; one belt of 250 was fired without interruption ; one belt with only one interruption, and of the remaining 700 30 per cent. failed. The report adds : "If the peculiarities of a gun are such as to require a perfection of ammunition, it is not serviceable, and its failure cannot

be ascribed to defective ammunition. Four years have shown that this defect is not unprecedented in this gun." An officer witnessing the trial of a gun manufactured for the German Government reports that it stuck badly.

Test No. 9 shows as follows:

Targets 12 feet high, 30 feet long.

Gun.	Rounds fired in four minutes.	Hits.			Percentage of hits.
		50 yards.	100 yards.	Total.	
Gatling...	1,547	305	207	512	33
Accler...	795	215	149	364	46
Gardner...	538	104	52	156	29
Maxim...	720	275	124	399	55
Skoda...	875	207	234	441	50

The Skoda gun was fired for 2 minutes and 45 seconds; only, the ammunition supply giving out. The Gatling was fired without interruption, and the Maxim had five interruptions in the first two minutes. The Gatling scored 512 hits and Maxim 399, but it is not to be supposed that the 1035 rounds from the Gatling and 321 rounds from the Maxim, which did not score, would have been entirely wasted in firing at as large a target as a ship. The minority report states that obviously the advantage is with the gun which fired the greater number of rounds. If a gun will not deliver its fire when called upon the most phenomenal efficiency at some later but uncertain moment cannot redeem the situation. The minority concludes: "The Gatling gun has been in use in the naval service for many years, and I have the honor to recommend that it be retained as the gun likely to prove serviceable."

The Carpenter Projectile.

The following is the official report of a test of 13 inch Carpenter armor piercing projectiles made August 14, 1894: Gun used, 13 inch B. L. R. No. 2, on hydraulic mount; plate, "Indiana's" 14-inch diagonal nickel steel armor, Bethlehem Iron Company, weighing about 16 tons; secured in the usual way. Line of fire normal to plate at center; distant from muzzle of gun, 387 feet. This plate had already been attacked by three 10-inch armor piercing projectiles in ballistic test of plate. Charges, 327 pounds; striking velocity, 1475 f. s.; striking energy, 16,610 foot tons.

Round 1.—Carpenter armor piercing shell, normal weight and dimensions, hardened $1\frac{1}{2}$ inches below bourrelet, struck normally 29 feet from left edge, 30 inches from bottom and 15 inches from edge nearest 10-inch impact; penetrated plate backing, one 16-inch oak strut, about 18 feet of earth; left butt and fell about 200 feet behind plate; recovered entire and uncracked, but somewhat set up. Plate through-cracked top to bottom through this impact and old impact, as above, the portion of plate to left of crack being detached and thrown down to the left. Plate also through-cracked horizontally from this impact through 10-inch impact No. 1 to right edge. The upper plate inclined outward from the backing at an angle of about 6°; held there by one loose armor bolt in upper right hand corner and by three armor bolts along lower edge; backing and structure badly damaged.

Round 2.—Carpenter armor piercing shell, normal weight and dimensions, hardened $1\frac{1}{2}$ inches below bourrelet;

penetrated plate backing 10 feet earth; glanced upward, fell 100 feet behind plate, entire and uncracked but slightly set up and distorted. Plate and backing entirely wrecked. Whole structure badly damaged, four of the uprights and three or the back struts being destroyed.

Table of Dimensions of Shell.—Lot 4.

	Before fire.	After fire.	Difference.	Remarks.
	Inches.	Inches.	Inches.	
Length.....	39.90	38.85	1.05	Shell symmet-
Bore.....	12.93	13.18	0.25	rical and uni-
Body 1.....	12.91	13.28	0.37	formly set up,
Body 2.....	12.90	13.38	0.48	maximum in-
Body 3.....	12.90	12.92	0.02	crease in mid-
Band.....	13.14			dle of body.
Rear.....	12.85	12.85		

Lot 5.

Length.....	39.89	38.39	1.50	Shell uniformly
Bore.....	12.94	13.20	0.26	set up, but
Body 1.....	12.90	13.18	0.28	power distort-
Body 2.....	12.90	13.36	0.46	ed $\frac{1}{4}$ inch from
Body 3.....	12.90	12.93	0.03	original axis.
Band.....	13.14			
Rear.....	12.85	12.85		

There being no thicker plate than 14 inch available other than Harveyized plates, and as projectiles complied with specifications as to thickness of plate, acceptance of lots 4 and 5 Carpenter 13-inch armor piercing projectiles was recommended.

It was stated to-day at the Department that May, the discharged employee of the Carpenter Steel Works, who complained of irregularities in the manufacture of Carpenter armor piercing projectiles, demonstrated that he was not a good mechanic and was not even familiar with placing a projectile properly on the lathe. He made two attempts of several days each. An officer was detailed with him and measured the projectiles as he pointed them out. In every case they were either absolutely correct or within the allowance. He finally left and did not reappear. The test of two lots of these projectiles above officially reported is regarded as finally disposing of the May charges, and no further investigation will be allowed.

THE WEEK.

The fleet Cunarder, "Campania," in her last week's westward trip established her right to the title of Queen of the Atlantic. She accomplished the voyage from Queenstown to Sandy Hook in 5 days, 9 hours and 27 minutes, beating the previous westward record—that of the "Lucania"—by over three hours, and landing her passengers, for the first time, on the Friday evening. The average speed made was 21.49 knots per hour for the whole trip. The list of runs was as follows: August 12, 516 knots; August 13, 528 knots; August 14, 543 knots; August 15, 525 knots; August 16, 545 knots; August 17, 126 knots. The "Campania" now holds both the westward and eastward transatlantic records.

An entirely new departure in printing has been taken by the *Pall Mall Magazine* of London. The printers of that periodical are making use of the phonograph in place of the usual "copy." The cylinder is removed after an article has been spoken into the machine and

sent to the printing office, where it is placed in a duplicate machine, and the compositor puts the tubes to his ears and sets in type what he hears. If the machine talks too fast he can stop it.

The California fruit trade has been unusually active, shipments to the East during the past few weeks being the heaviest on record.

Work on the new terminals of the Brooklyn Bridge is being pushed as rapidly as possible. At the New York end the new entrance and exit for trucks will probably be ready for traffic in the course of a week, while at the Brooklyn end the construction of the new terminal station, extending down to and over Sands street, to join the present structure, is progressing fast.

Enormous withdrawals of whisky from bond are taking place, distillers being anxious to escape the additional tax provided by the new tariff bill. The Treasury officials estimate the amount of the spirit that will be withdrawn from bond under the present tax of 90 cents a gallon at 6,000,000 gallons. Internal revenue receipts exhibit a material increase accordingly.

Cable advices from Europe to the public press indicate the fact that British exporters are much pleased with the settlement of the tariff question. Although not particularly enthusiastic over the Gorman bill, they prefer that measure to a continuance of the condition of uncertainty. Many traders express the opinion through the newspapers that the evil effects of the McKinley act upon the United Kingdom have been greatly overstated. The shrinkage of British exports in the first six months of 1894 equaled the shrinkage of the previous four years. The former was due to the fact that the traders were working from hand to mouth, ordering only what they immediately required, and thus remaining in a position to profit from any remission of duties.

The proposed amendment to the New York State Constitution authorizing the Legislature to fix the hours of a day's labor has been reported unfavorably to the Constitutional Convention now sitting at Albany.

Four tank steamers carried away 6,000,000 gallons of petroleum from the port of New York in two days of last week.

New Orleans advices give an estimate of 850,000,000 pounds for the sugar crop to be harvested next month.

There is some talk in Wall street of an extra dividend being declared on National Lead common stocks at the close of this year's business. The National Lead Company have no floating debt, and the stock is said to be earning more than 6 per cent. on its capital.

The dire predictions of the Eastern peach growers, made in the spring, appear to have been verified this year. The peach crop is pronounced to be an utter failure.

The Treasury statement of exports for the first seven months of this year shows a marked decrease in the export movement of wheat, rye, oats, petroleum residuum, naphtha, tallow and canned beef, as compared with last year. Other breadstuffs, provisions and oils exhibit a considerable increase over the same period of last year.

The corn crop throughout the South is fairly good, though short in some sections, owing to the lack of rain and excessive heat.

The Iron Age

New York, Thursday, August 23, 1894.

DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR.
CHAS. KIRCHHOFF, - - EDITOR.
GEO. W. COPE, - - ASSOCIATE EDITOR, CHICAGO.
RICHARD R. WILLIAMS, - HARDWARE EDITOR.
JOHN S. KING, - - BUSINESS MANAGER.

The Tin Plate Dipping Industry.

We have alluded briefly in our comments on the new tariff to the effect which its passage will have on one branch of the young tin plate industry in this country. Quite a considerable quantity of tin plate has been manufactured by dipping imported black plates. Under the new metal schedule the duty on these will be 1.1 cents per pound, with $\frac{1}{2}$ cent added on such plates when pickled and cold rolled, which is an essential requisite for black plates intended to be tinned, making the full duty on the black plates 1.22 $\frac{1}{2}$ cents. Since the new duty on tin plate is 1.2 cents, this is 0.02 $\frac{1}{2}$ cent higher than the duty on the finished tin plate. There is the bare possibility that the manufacturers of black plates abroad might reduce their prices so as to leave a margin for their customers in this country, but as they are also manufacturers of tin plates it would seem more reasonable that they would then abandon the black plate trade and sell only the finished product.

The "dippers," as they are known in the trade, will have to face the problem without any reference to chances from that source. Naturally this industry has developed more particularly in the territory east of the Allegheny Mountains, although, as a temporary expedient Western works have resorted to the practice, the most conspicuous instance being that of a plant in the Indiana gas belt, started by Welsh manufacturers. The principal work has been done in this direction in Philadelphia, Baltimore, Norristown and New York and its vicinity. During the last quarter of 1893 more than 7,500,000 pounds were produced by six concerns at the places mentioned, out of a total, officially reported, of 11,443,572 pounds.

Cut off hopelessly from their former source of supply, the Eastern dippers must either produce their own black plates or they must buy them in the open market, or, finally, they must either move their machinery to some point where they can utilize it to best advantage or sell it to others who can utilize it.

If they consider the question of putting in rolling mill plants of their own, they must face the fact that their Western competitors can get the steel bars cheaper than they can hope to buy them. Against that they have the advantage of cheaper labor and close proximity to important markets for their product. But they are near the seaboard and must therefore meet

foreign competition at a relative disadvantage.

On the whole the Eastern dippers are not favorably located for buying black plates in the open market, because that particular industry has developed most in the West.

In some cases the removal of plant to a more favorable locality will probably prove the most attractive scheme in spite of the partial sacrifice of investment which that will involve. Possibly in some instances an opportunity may present itself to consolidate with black plate mills recently started in the West.

The increase in the consumption of black plates for tinning has latterly been very much greater than the increase in the domestic supply. It is known that one large tin plate works which does not make a pound of black plates turned out in the month of July very close to 3,000,000 pounds of tin plates. There is evidently room for a great expansion in the black plate trade, since it is certain that the American tin plate industry will not alone hold its own, but that it is bound to expand so long as it enjoys the advantage of starting with cheap steel.

Premature Rejoicing Abroad.

Cable dispatches report much rejoicing abroad over the final passage of our new tariff. It would seem that foreign manufacturers in sundry lines are so sanguine of an enlarged market for their products in this country that they are already arranging for more actively operating their establishments. Some allowance must be made for exaggeration by correspondents, as it is hardly possible that action would be taken so quickly and immediately become public. If foreign manufacturers are to any great extent preparing to make goods for this market they are scarcely justified by existing conditions. No great increase in the demand for foreign goods here can be expected until general trade conditions improve, and at present we are making only slow progress in that direction. A large proportion of our workmen is still unemployed, and consumption must remain much under its normal volume until they are again earning something. Even though stocks of goods are light everywhere, merchants will not be disposed to speculate on the future until they see signs of improvement in the business horizon. Unfortunately, also, the bill which has just passed is not of a character to give more employment to American workmen. In the course of time, it is to be hoped, the settlement of the long-drawn-out tariff agitation will cause general business to resume its wonted course and full employment will then be found for all who wish to work. But no stimulus to enterprise is afforded by this new measure, and it is difficult to see how any sudden increase is to be expected either in the demand for domestic or foreign products. Even in

lines in which duties have been greatly reduced it is not probable that domestic manufacturers will surrender any considerable part of their home trade to foreign competitors without a severe struggle in which every expedient will be adopted to reduce cost. And meanwhile merchants and consumers are likely to purchase stocks cautiously until they see what will be the outcome of such a struggle.

Navy Work and Industrial Establishments

American manufacturers must look with grave concern at the attitude which the representatives of the Navy Department have assumed in their relations with works furnishing materials. Everybody knows that the Government is an unsatisfactory customer in any case, and that during the past year there has been added to other aggravations, the serious drawback of very slow pay. Even that is borne without much complaint; but the limit of human endurance is reached when the producer is made to feel that he is regarded as a scoundrel until every order is filled, and that he has dropped back into the same category as soon as he has taken a fresh order.

We are willing to admit that our navy officers have gone through a very trying time, and that they must naturally be anxious to guard against any danger of being proven incompetent. Their own lives as well as those of their men and great interests of the nation may depend upon their detecting defects and excluding bad work. From their point of view the happenings of the past year have justified suspicion, to put it mildly.

But the department is now going altogether too far. On a trivial matter manufacturers of long standing in the community are subjected to all the odium which a crazily sensational journalism can cast upon their fair name. On the unsupported testimony of an informer a manufacturer of armor piercing projectiles is placed under suspicion. Not the slightest evidence of the truth of his assertions has been brought out by the man himself after he had been given full opportunity to prove his case.

Happenings like these are calculated to do very serious lasting harm, not alone to the manufacturing industries of this country, but also to the navy itself. They strike a fatal blow at that private enterprise through which progress in bettering the quality of materials and improving appliances must come. Who is going to advance money to inventors, or put up expensive plants for the privilege of being treated as a rascal as long as he remains in the business? The inducement of great profits will certainly not weigh with any self respecting manufacturer. Any works which have private customers will be doubly careful about taking Government contracts, because their reputation for honesty

may suffer keenly from a trumped up scandal.

If the policy pursued by the Navy Department is continued American manufacturers will withdraw from a business which in itself is hazardous, because of the uncertainty concerning future orders, and which is vexatious even when inspection is fairly and reasonably conducted. This means that the navy will have only a very small circle of producers to deal with, who must demand and will get prices yielding enormous profits to compensate them for the risks they run.

Duluth News.

For two years and a half, or since the Mesaba range first came into prominence, a great amount of exploratory work and search for iron has been carried on in small territory on the western part of the range. From 100 to 200 men have steadily been employed on seven sections of land in the connecting corners of towns 57 and 58, ranges 20 and 21. This work has been magnificently rewarded. Over 300 test pits have been sunk into ore of a depth of from 50 to 170 feet, and an ore body larger than any elsewhere on this range has been uncovered. This ore deposit is from $\frac{1}{4}$ to $\frac{3}{4}$ mile wide, and is not less than 3 miles long. The average depth of the ore appears to be about 80 feet. The magnitude of this deposit, therefore, is something beyond computation.

Five companies have been engaged in exploration on this tract—the Lake Superior Iron Company, who have discovered and are developing three mines; the Mahoning Ore Company, who also have three mines; the Merritt Brothers, the Sheridan and the Sellers. The first of these companies have leased their mines to the Rockefeller combination for a heavy bonus and a half interest in the profits of the operation; the second is a syndicate of Mahoning Valley ore consumers, who intend to mine the ore for their own use, and whose annual consumption under normal conditions is about 750,000 tons, and the last is a property now in the possession of a heavy firm of Pittsburgh operators and consumers, Shoenberger, Speer & Co. The ore deposit, whose Eastern boundary is in section 31, town 58-20, runs west into 36 of the adjoining town, across into 1 of 57-21, and across 2 and into 3 of the same township.

The Mahoning Ore Company have a tract eight forty's in length, running across the entire northern line of sections 1 and 2. On this transit and level lines were run, and pits sunk at the intersection of every 400 feet. Some 140 pits were sunk here in ore, and the overlying earth is only from 13 to 20 feet in thickness, so that the entire tract may be mined by the open cut, steam shovel method. The company's Nos. 1 and 3 mines are on this tract, its No. 2 being further south. The Lake Superior Company have a similar tract to the south of and joining the Mahoning, and on this its Nos. 2 and 3 mines are located. This is also a nearly solid body of ore. West of these two companies lies the Sheridan, with 19 pits in ore. South of them the Mahoning and Lake Superior both have more ore. East of them is the Sellers, with 1,500,000 tons shown by measurement. North of the Sellers, in section 31, town 58-20, is the Lake Superior No. 1, and joining it on the west is the Merritt pool.

All these mines are under lease from the original owners at royalties varying from 25 to 40 cents a ton. With the single exception of the Merritt, which is the property of the State school fund, the lands belong to lumbermen of Saginaw, Detroit, Duluth and other places. All these lands were bought for pine and have returned to their owners a good profit in the pine alone. The Mahoning pays 30 cents per ton on its mining output, the Lake Superior 25 and 30, the Merritt 40 and the rest 30.

The ore found here is more lumpy and coarser than much of that on the Mesaba, so there will not be the difficulty in the furnace that is complained of with other ores of the range. It is well within the Bessemer limit, and some of the properties claim that they will be able to guarantee cargoes of 65 per cent. iron, and not above 0.035 phosphorus. The district will produce some ore this year, and it is expected to be a very large shipper next season, by which time there will be two railroads connecting it with the lake. It is certain to cut a great figure in Mesaba production.

Rusting of Iron and Steel.

Mr. Bramwell is quoted as asserting, in an address before the British Association, that neither bright iron nor steel will rust in pure water or pure air. The presence of carbonic acid or some similar agent, he said, seems necessary, although the final product may be destitute of carbon; and even when oxygen, moisture and carbonic acid are all present, rusting will not take place unless the moisture condenses on the surface of the metal. When rusting does take place under ordinary circumstances, the first stage appears to be the formation of ferrous carbonate, this carbonate being next dissolved in carbonic acid water to form ferrous bicarbonate, which latter is then decomposed in presence of air and moisture to form hydrated ferric oxide, magnetic oxide being found as an intermediate product. In regard to the progress of corrosion, a polished bar will resist oxidation for a comparatively long time, even under somewhat unfavorable conditions, but once the rust has commenced only a short time is required for it to cover the whole bar. One reason assumed for this is the fact that the rust is electro-positive to the iron; and it is partly attributable to the final product, the hydrated ferric oxide, being formed only at the end of several intermediate stages of the oxidation, and also to its hygroscopic properties, which favor the absorption of the moisture from the air. In certain situations other acids besides carbonic may take part in the corrosion of iron.

Ground was broken on Monday for the new cantilever bridge across the East River which is to give the Long Island Railroad an entrance into New York City. The bridge will extend from Sixty-fourth street on the New York City side to Ravenswood, on Long Island shore, crossing Blackwell's Island, and leaving a channel of about 855 feet on each side of the island. The total length will be 2855 feet. Two piers each will be built on the New York City and Long Island sides, and two on Blackwell's Island. The total height above water is to be 135 feet. The pier will have a capacity of four railroad tracks, besides a roadway and foot walks on each side. The original

charter for the bridge was secured in 1867, but has not hitherto been utilized. Chief Engineer J. H. Davies, who is to superintend the work of building, says that the structure will be completed in two years.

New Publications.

PROGRESS IN FLYING MACHINES. By O. Chanute. Size 6 x 9, 308 pages. Illustrated. Published by the *American Engineer and Railroad Journal*, New York. Price, \$2.50.

It is seldom that a book dealing with a scientific subject appears at a more opportune time. Aeronautics is attracting wide attention in all civilized countries; earnest effort is being made to formulate the principles that must underlie successful flight; study of the attempts that have been made is being prosecuted carefully, and, most important of all, experiments are in progress which lead to the belief that the flying machine is a possibility, perhaps of the near future. Mr. Chanute's book, therefore, is a most welcome contribution to the subject, since it gives a complete historical review of the efforts of inventors to accomplish flight with apparatus. It needs but a glance at the work to appreciate the fact that the author has searched the field thoroughly and collected data of the greatest value. He has gathered all the records of such experiments which were accessible, and has endeavored to show the reason for their failure and to explain the principles governing flight. His study has led him to believe that we may eventually fly through the air.

The book is divided into three general heads: Wings and Parachutes, Screws to Lift and Propel, and Aeroplanes. The legends of antiquity are very properly discarded, as they have no value, but merely indicate that artificial flight early appealed to the imagination of man. Under each head the experiments are arranged chronologically and drawings showing the peculiarities of construction of different types of machines are reproduced whenever possible. It is under the title "Aeroplanes" that we find the most interesting particulars, since it is in this direction that the most promising work is now tending. The author's opinions and criticisms are presented while describing the experiments, this being, in his opinion, a better plan than to offer them in a series of abstract statements and propositions. The following table, based "upon experimental data of weights actually sustained, indicates that aeroplanes are probably the best form to experiment with, because they admit of a larger proportion of the whole weight being appropriated to the motor."

Comparative Efficiency of Various Forms.

Kind of apparatus.	Pounds sustained per horse-power.	Proportion available for motor.	Resulting possible weight of motor per horse-power Pounds.
Screws ..	45	$\frac{1}{4}$	15
Wings.....	100	$\frac{1}{4}$	25
Aeroplanes	100	$\frac{1}{2}$	50

"This also indicates the possibility of success in artificial flight, with motors weighing 10 or 15 pounds per horse-power, provided that the remaining problems be also solved; but it must not be overlooked that more power will

be required in rising from the ground than in horizontal flight, and that the actual proportion of the total weight available for the motor, although conservatively estimated from the best data available, is still a matter to be proved by experiment."

In an appendix the experiments made by Herr Lillenthal in 1893 are described fully. The book closes with that most essential adjunct—a very copious index.

Indiana's Natural Gas.

The following is the report of State Gas Inspector Jordan for the year :

While natural gas has been prospected for by the drilling of wells in nearly every county in the State of Indiana, yet outside of the areas mapped out and published with former reports from this department, no developments have been made of any scientific or commercial importance. The boundaries of the "belt," as it is called, have been clearly defined. No discoveries have been made that make necessary any change. Vast sums of money have been expended in this State in prospecting for natural gas, without any returns. Much of this could have been saved if the prospectors had understood the conditions necessary for the production of gas.

The perpetuation of the natural gas fields is a question of vital interest to Indiana, as this State has been benefited to the extent of millions of dollars within the last few years by the discovery of this valuable fuel.

The History of Gas.

The history of the natural gas fields shows that they are of only temporary duration. Indeed, it is only natural that the accumulations of centuries should be exhausted in time by the constant and immense drains to which all the fields have been subjected. Nature cannot manufacture it as fast as it is consumed, and the natural flow of the wells must soon become exhausted. Gas in the great fields of Pennsylvania and Ohio is a thing of the past, if the natural flow of the wells is to be relied upon for the supply. Affairs are in a distressing condition in those States, and especially in Northwestern Ohio, as all the towns are left burdened with debt and with no other resources at their command. Their era of prosperity is at an end, so far as it depended upon natural gas. In many of these towns, as a natural result of the criminal waste of nature's most valuable fuel and the unnatural business excitement and wild speculation that obtained for years, it may be truthfully said "that their last days shall be worse than their first." It remains to be seen whether the same disastrous conditions will mark the end of natural gas in Indiana. About the time that natural gas began to fail in Ohio and Pennsylvania, the great fields of Indiana were discovered, and their vast extent, as well as the apparent stability of the supply of the wells seemed to warrant the belief that at last a permanent supply had been found. As a result of this discovery and the failure of the Ohio fields, the factories accepted the offer of the cities and towns in the Indiana gas field and removed their plants to this State. The loss of these factories to Northwestern Ohio caused a terrible panic and collapse throughout that gas belt, and fortunes sank from sight as values de-

clined to their normal conditions. Over \$300,000,000 has been invested in this State in manufactories, and others are now being erected throughout the gas belt. Pipe lines were run to the gas field from Chicago and from many of the principal cities and towns in the State and every effort has been made to gobble up as much of the territory as possible. Slowly the ends of these pipe lines have been converging to a given point, until now but little of the gas belt remains to be developed. There is no question but the time will eventually come, although a long way off as yet on account of the vast extent of the fields, when every inch of Indiana gas territory will have been developed, and then the supply will rapidly diminish.

The Failure Has Begun.

Indeed the failure has already begun. Already wells are being abandoned every month, and the rock pressure in many parts of the field is rapidly diminishing. The average field pressure has slowly but surely fallen off, and now stands reduced from 320 pounds, original pressure, to 240 pounds, average pressure over the field.

To preserve a full supply of fuel gas to their patrons the different companies and the manufacturers have been obliged every year to reach out to remoter fields, drilling many new wells and extending great pipe line plants at very heavy cost.

The limit of extension is nearly reached. Many wells are wet; nearly all show moisture when heavily drawn upon, and they must be held back or risk the danger of being flooded out.

At the rate of pressure reduction that is now going on, and by a continuance of the present extravagant and wasteful method of consumption, it is only a question of a very short time when artificial pressure will have to be used to force the gas through the pipe lines. The use of pumps for artificial pressure is fraught with most serious risk of reducing the gas pressure below the water pressure, and so destroying the wells. The question of perpetuating or husbanding the supply of the field becomes a vital one. Indiana has the largest and best gas field ever discovered, and as no new fields are in prospect it seems that these are the best fields that will ever be brought into requisition for manufacturing purposes.

With these gloomy conditions of the supply staring us in the face, we should awake to a realization of the fact that natural gas is a temporary blessing. It is the plain duty of every good citizen to co-operate to the fullest extent to preserve the supply of gas so long as it is possible to do so. It is the plain duty of managers of companies, or those engaged in furnishing supplies of this fuel, to sound the note of alarm and to point out the way by which the flow of gas can be prolonged, and this great source of comfort and convenience continued over the longest possible period. A system of the strictest economy should be enforced, and the remainder of the precious gas should be distributed to the consumers as ordered by special acts of the Legislature.

An Era of Prosperity.

Immediately upon the discovery of natural gas in Indiana an era of prosperity began that has been unparalleled. Immense manufacturing establishments were located, and in time, when their fires, fed by nature's best fuel, started, great train loads of their products were sent out from the gas belt every day.

Villages became prosperous towns, and towns grew in a few months into thriving cities, and lots were sold at high prices many miles from their centers.

Much wild speculation has prevailed. A great deal of unnatural and unhealthy excitement in business has marked the history of some of these towns since the discovery of this fuel. However, this has not been carried to the extent that it was in the towns of Ohio. The business men of these towns, profiting by the fate of the towns in the States above mentioned, have been more conservative. One of the worst features of the excitement that has prevailed was the belief in the ideas that natural gas was to be perpetual.

This belief fostered extravagance and waste. It can be shown from facts obtained and reported in this department that the waste of gas during the first four years after its discovery in the fields of Indiana, amounted to more than \$20,000,000. And this estimate, too, is made upon the extremely low prices at which gas has been sold throughout the State.

This condition of affairs continued, as I say, for four years before the people who were vitally interested were willing to admit the fact that natural gas was failing, and failing rapidly, too. The pressure began to go down in all the principal centers, and, in fact, nearly all over the field.

The supply in many places began to fall short, and there was much suffering during the hard winter of 1892-93. A great many factories in the towns deriving their supplies from this gas field were shut off from the lines and asked to burn coal.

Alarmed by the Great Waste.

These stern conditions have at last aroused the people to view the situation in its true light. Much of the extravagance and waste have been stopped. Men are seeking to find out the best means for husbanding what remains of this valuable fuel. Some wholesome laws were passed by the Legislature for the preservation of this fuel. In regard to these laws, I regret to say that in some localities they have not been enforced as rigidly as they should be, and the fault has been with the local officers charged with enforcing the laws. Many of these officers are aspirants and are afraid of their popularity.

One of the wastes of gas that still prevails is in the domestic consumption. With the appliances for burning gas that are almost universally used at least 50 per cent. more gas is used than is necessary to produce the required amount of heat.

The greater the pressure in a mixer, the greater number of cubic feet of gas is consumed with only a fixed amount of air. Natural gas, like any other fuel, requires a certain amount of air, in order to have a perfect combustion. It follows, then, that the higher the pressure the greater the amount of gas that passes through the mixer and the more imperfect is the combustion. With the imperfect appliances now in use the greatest amount of heat is not obtained. This is not only wasteful, but it is dangerous from the fact that this half burned gas is liable to escape into houses and cause suffocations or explosions.

With the mixers now in general use a pressure of from 6 to 10 ounces in the low pressure mains will furnish as much, if not more gas than can be perfectly consumed. Under the conditions existing in most, if not all, of the towns and smaller cities of the Indiana gas

field pressure of from 1 to 5 pounds is carried.

Improved Mixers and Burners.

Too much cannot be said on this question. All who are interested in the perpetuity of this fuel should be taught to know what extravagance and waste are being practiced and the causes. Consumers have been slow to adopt improved mixers and burners. In many of the towns the gas plants are not arranged for the proper and equal distribution of the gas. Improved appliances and devices cost money, and so long as the present method of paying for the gas by the month or year is permitted, just so long will the present waste continue.

The remedy is to compel, by legislation if necessary, consumers to pay for the gas used by meter measurement. When this method shall become the rule consumers will find it to their interest to adopt improved methods for burning this fuel, and will economize its use in every way possible. Until this is done I can see but little hope for economy in the consumption of this precious fuel. The waste will continue and the end will be correspondingly hastened. The supply of gas is certainly failing. It may not be possible to tell just how long it will last, but the final exhaustion is inevitable. The period of exhaustion has been entered upon in the Indiana field and the end is close at hand. The theory of the generation of this fluid in commercial quantities is not now believed or advocated by any person who has studied the conditions as they exist. Indeed, it is more than probable that this generation ceased many many ages ago. There is a given amount stored within the area of the gas bearing rocks. This storehouse is tapped in Indiana by many hundreds of wells, and millions of cubic feet are drawn out every day. As gas is withdrawn water or oil comes in and takes its place. Turn whichever way we may in our explorations and theorizings, the fact of the final exhaustion of this fuel stares us in the face.

The Initial Gas Pressure.

The following is the pressure found in different localities during the year 1893. At many of the places, however, the pressure given was obtained only from new wells at a distance of from two to four miles from the towns, the wells in the towns and immediate vicinity showing far less pressure, and many wells being practically exhausted:

	Pounds.
Greenfield, Hancock county.....	250
Carthage, Rush county.....	120
Noblesville, Hamilton county.....	240
Sheridan, Hamilton county.....	240
Kokomo, Howard county.....	250
Marion, Grant county.....	250
Gas City, Grant county.....	300
Fairmount, Grant county.....	300
Elwood, Madison county.....	300
Frankton, Madison county.....	300
Anderson, Madison county.....	240
Alexandria, Madison county.....	300
Summitville, Madison county.....	300
Chesterfield, Madison county.....	290
Muncie, Delaware county.....	240
Albany, Delaware county.....	280
Eaton, Delaware county.....	290
Hartford City, Blackford county.....	260
Montpelier, Blackford county.....	250
Camden, Jay county.....	225
Dunkirk, Jay county.....	275
Greensburg, Decatur county.....	175
Fountaintown, Shelby county.....	210
Waldron, Shelby county.....	225

These pressures were found in the most instances in new wells. In their immediate neighborhood are found older wells showing a much less pressure, even below 100 pounds.

The wells connected with the pipe lines conveying gas to Indianapolis,

Crawfordsville, Frankfort, Lafayette, Logansport, Peru, Wabash, Huntington, Bluffton, Fort Wayne, Decatur, Portland and Shelbyville show pressures from 225 to 260 pounds.

The wells and the pipe lines leading to Chicago and Richmond are better, showing 280 and 290 pounds pressure. These companies, in order to keep up the necessary supply of gas, are compelled to drill many new wells each year to take the place of those that have become exhausted. Each year these companies have been compelled to acquire new leases and extend their lines, until there is but very little territory to be obtained. If, in drilling these new wells, the pressure of the original wells could be obtained there might be some hope of perpetuity of the gas. But such is not the case. The new wells are coming in with a constantly decreasing pressure, and of a necessity will be much shorter lived than the original wells. All this goes to prove that the field is slowly but surely becoming exhausted. This exhaustion will be in an accelerated ratio as we approach the final end.

The Situation Is Grave.

The gravity of the situation can only be understood when it is known that from 225 to 250 pounds pressure at the head of the main lines is absolutely necessary to force the gas to the different cities that lie outside, but are obtaining their fuel from the gas field, with sufficient pressure to distribute it through the low pressure city lines to the consumer. And this pressure, too, is needed when all the reducing stations and district valves are wide open and every facility afforded for free circulation.

There remains now but a small average margin above the limit of low pressure. At the annual rate of pressure reduction, and by a continuance of the present extravagant and wasteful method of consumption, this small margin will be spent or exhausted in a very short time. When this shall have happened, artificial pressure by means of pumps will be resorted to for the purpose of distribution. It has been the experience of the gas areas of other States that when the initial pressure must be supplemented by artificial means that the end is very near at hand. A careful study of the conditions of the field in Indiana as they exist to-day will show that we have almost reached that point.

What must we do? Are we willing to go back to the use of wood and coal? After having enjoyed the conveniences and luxuries of natural gas for so long a time to do so would be a great hardship. In order to avoid doing so, or at least to put off the evil day as long as possible, consumers should be willing to adopt any method that would preserve this fuel and perpetuate its use for the longest possible period of time.

The Remedy for Present Evils.

In order to do this I have the following suggestions:

1. All gas should be sold by meter measurements, and this should be enforced by law.

2. Natural gas should not be used in the manufacture of bricks, tiles nor in the rolling mills nor melting furnaces of glass factories. In these factories a coarser and less valuable fuel can be used.

The highest and best purpose to which natural gas can be applied is the domestic use. It is in this use that it does the greatest good to the greatest number, and it is for this use that it should be preserved.

Gas Measurement by Meters.

The present consumption in the domestic use of gas, as I have said, is without doubt fully 50 per cent. greater than is actually necessary. This profligate waste of such valuable fuel is inexcusable. Now, if it is possible to check this extravagance, I believe the supply can be made to last several years. There is but one way to stop this reckless and criminal wastefulness, and that is to require each consumer to pay for just what the consumer uses. No more and no less. This can be done only by the use of a meter. Natural gas is a commodity, and a very valuable commodity, and every other commodity in the commercial world is sold by weight or measure. Experience has shown that this is the only just and equitable way of selling natural gas. The price per 1000 feet should be approximately the same as charged in cities where conditions are similar. The following are the net meter rates per 1000 feet charged in other cities: Detroit, Lima, Piqua, Dayton, Springfield, Toledo, Buffalo and Columbus, 25 cents; Pittsburgh, Alleghany and Erie, 22½ cents; Jamestown and Corry, 21.6 cents; Fostoria and Logansport, 20 cents; Indianapolis, Richmond and Fort Wayne, when sold to manufacturers by meter, 10 cents.

When the time comes that consumers will be compelled to pay for what they use, then, and not till then, will economy be practiced. Then it will be that the consumer will provide himself with the most improved appliances for the economical use of this fuel. There is a growing disposition to introduce meters into all the distributing systems of the natural gas companies. When this fuel was first brought into use the supply was so abundant that the reckless wastes of which I have spoken were tolerated. When it was taught, and generally believed by consumers, that the supply was inexhaustible, the necessity of economy was not felt. When it cost the same by the month or year, whether much or little was consumed, there was no inducement to economize.

Gas Formation Has Ceased.

I have before stated that it is held by all scientists and others who have given the matter any thought that gas is not being generated at the present time in any appreciable quantities, and certainly not in quantities sufficient to meet the enormous drain that is being made on the different fields to-day. This being true, the necessity for husbanding the supply in every conceivable way becomes apparent. The highest interest of every consumer is to make the product last as long as possible. Any waste or prodigality in the use of this most valuable fuel becomes at once a crime against the public good. "The greatest good to the greatest number" should be kept in view in the use and management of this fuel.

By prodigality and mismanagement the final failure of this product has been hastened all too rapidly. This failure cannot be overlooked. It is shown by the diminished initial pressure and by the presence of salt water.

An advance in price on the part of all municipal corporations for all the uses they undertake to supply is now the proper policy. The prices at which this fuel has hitherto been furnished has led to the undervaluing and wasting of gas. The supply will do towns more good by serving them longer if they are required to pay a higher price for the gas.

Natural gas is merely a transient phase

of the stored power of the earth. It is folly to talk of its taking anything like a permanent place in the work of the world. The claim that it can do so springs only from enthusiasm, and is unsupported by the facts. There is in reality but little of it, and this is found in but limited regions and cannot last long whenever its utilization is undertaken by the eager and masterful activities of our day.

If proper management of the field by the enforcement of wholesome laws and if economy in the use of gas is everywhere insisted upon and practiced, that portion of gas that yet remains stored in the Trenton limestone of Indiana may be made to last several years. It is to this end that all should work.

To Perpetuate the Fields.

Now that the final exhaustion of the supply of natural gas is an admitted fact, many persons are directing their attention to the finding of a substitute that shall combine all of its luxury and convenience. Plants for the manufacture of fuel gas have been built in many cities and are in operation with some degree of success. However, none, as far as I have been able to learn, has succeeded in manufacturing a fuel that is equal to natural gas. The inventive genius of the American people is unlimited, and I predict their success in this direction. Natural gas has been a great object lesson to great communities as to the advantage of gaseous fuel, and it can hardly be that this lesson will be given in vain. It has prepared the world for something much better than itself. Natural gas has done a very important work.

In many of the gas fields, as has been before stated, when the gas is exhausted in the porous rock, oil takes its place. A theory has been advanced by some that the gas fields can be perpetuated by forcing air down the wells into the rock by means of powerful pumps. Some of the cities and towns of Northwestern Ohio, I have been informed, are now engaged in very expensive experiments in order to test this theory. The Trenton rock in those fields, being oil-bearing, is porous and saturated with oil deposits. It is thought that by forcing the air through the rock it becomes carbonated, and after being thus filtered returns to the surface of the earth, where it is piped and consumed.

In regard to this theory, the facts at hand are not sufficient to warrant me in hazarding an opinion of its practicability in the production of fuel. That air can be forced through the porous portions of the Trenton rock is undoubtedly true. Demonstrations of this have been shown in the Indiana field. A high pressure pipe line passing through low pressure locality and having low pressure wells connected with it will cause an increase in the well pressure in the immediate territory surrounding such wells. This has been experienced at Noblesville, Hamilton County, and at Kempton, Tipton County. In fact, this condition may be observed on any pipe line that has wells connected therewith whose initial pressure is lower than the line pressure. This fact is so well known that many gas companies disconnect their low pressure wells that lie in the immediate neighborhood of wells belonging to rival companies. Without doing this, they know that by this means they would be furnishing gas to their rivals without compensation.

In regard to the air becoming sufficiently carbonated in its passage through the oil deposits contained in

the pores of the Trenton limestone, to make it a fuel equal to natural gas, I have no means of knowing. I shall await with a great deal of interest the outcome of the experiments that are now being made. In partial support of what is expected to be accomplished by the supporters of this theory, it may be said, first, that within the greater portions of the gas fields of Ohio and Indiana large oil deposits are found in the porous rock, and second, that the forcing of air through this porous rock by artificial means is practical.

In the putting in of gas plants or in their extension or improvement, every means should be adopted in order to make them absolutely safe. Human lives, as well as property, are too valuable to be endangered by the insecure handling of this powerful agent, through mistaken and criminal notions of economy.

The Transportation of Gas.

One of the great wastes of natural gas that exists in Indiana gas fields is the leakage from pipe lines. During the early days of the fuel when most of the pipe lines were laid, experience had not then taught the necessity of using the best pipes and fittings. Cheap pipe and cheap connections were the rule. Especially is this true in what is known as "farmer lines," that is, lines that supply people who live in the country. These lines, as well as many that supply the towns and cities, were laid by persons of no experience, and were not tested as to their capacity to withstand high pressures. The result was that leaks were at almost every connection in many of these lines. Much improvement, however, has been made in many of these plants. Better material and better work have been substituted. Especially is this true of the plants that have been put in more recently. Good material is now used, and the lines are thoroughly tested before being subjected to the pressure from the gas wells. A fair estimate of the results of these improvements would be that the loss from leakage from the pipe lines has been reduced more than one half. Not only was there a great loss of valuable fuel from this source, but there was a great danger to life and property. Many accidents have occurred that have resulted in the loss of life and the destruction of much valuable property that can be directly traced to leakage in pipe lines and mains.

All pipes used for the conveyance of natural gas should be tested by hydrostatic pressure up to at least 300 pounds to the square inch, and the pipe should be rapped with a hammer while under pressure.

Cast iron pipe may be generally used for low pressure, but it should not be used for high pressure mains. In conveying gas under a pressure of 50 to 250 pounds to the square inch only the best of lap welded wrought iron or steel pipes should be used. And on this kind of pipe, when the threads are cut, the metal should be made thick, so that the pipe shall not be reduced in strength at that point. One source of great weakness is in the special fittings. They should all be made of the best malleable iron or steel. Many companies are now having their fittings made to order much heavier than those generally found in the market. Even the best wrought iron and steel pipes should be subjected to a hydrostatic pressure of at least three times as great as any pressure that it will be subjected to in use.

By a special act of the General As-

sembly of Indiana of 1891 the pressure in high pressure pipe lines is limited to 300 pounds.

Substitutes for Natural Gas.

That the supply of natural gas will last but a little longer is conceded by all persons who have given the matter careful and serious consideration.

That a gaseous fuel from some source will continue to be extensively used is also generally conceded. Natural gas will have prepared the way for the use of gaseous fuel. The failure of natural gas will, doubtless, bring heavy losses to many individuals, firms and corporations. Still it will have accomplished much good in that the knowledge gained by the experience during the years of its existence will greatly benefit the public in general.

The use of a gaseous fuel generated in producer furnaces is now largely used in the operations in metallurgy. The great saving in this method of firing over that of the direct use of coal is probably due in a measure to the utilization of the waste heat in the regenerative chambers. Fuel gas of this character, however, that is made by the admission of air to the incandescent fuel, cannot be carried long distances except at an expense greater than its value as a heat producer.

In the manufacture of water gas, coke or anthracite coal must be used. No process has been invented yet whereby soft or raw bituminous coal can be used successfully for this purpose. So long as this is true this gas cannot be made cheap enough to come in competition with direct firing with the soft coals of Ohio and Indiana.

It is probable that a mixture of coal gas, water gas and producer gas will be the fuel gas of the future for domestic purposes.

Many people are looking anxiously to some of these fuel gases, or to a combination of them, as their source of fuel when natural gas shall have failed. No doubt before that time arrives the manufacture of these gases will have been brought to such a state of perfection as to cheapen them so as to bring them within the reach of all the uses to which this fuel is applied. The vast sums of money invested in conducting mains will not be lost, as the public in many localities will have become so accustomed to a gaseous fuel that they will never return to the use of solid fuel. Then it will be that the slack and waste at our coal mines will be converted into fuel gas and be conveyed through the mains laid for conveying natural gas to manufacturing places and for domestic use.

In its weekly review of the anthracite coal trade of Pennsylvania, the *Philadelphia Ledger* says that it remains inactive, with a light demand, and prices as weak and low as they have been at any previous time this year. The reports from all quarters on the condition of the anthracite trade are alike, of dull business. The dealers and large consumers everywhere are holding off from placing contracts and the buying of coal continues only from hand to mouth to supply immediate requirements. The resumption of manufacturing industries in all parts of the country, now that the tariff question is settled is, however, bound to increase the consumption of fuel, and if the powers that control the anthracite trade can keep the output of coal within reasonable bounds for awhile the beneficial results will be soon felt and appreciated.

The Iron and Metal Trades.

Thus far the expected general improvement in the Iron trade has materialized only to a very modest extent. In some lines and in some localities there has been a somewhat larger demand, but its volume is far from being such as to make the slightest impression upon prices. Since conditions have been abnormal, so far as supply is concerned in the trade of the Central West, a return to ordinary state of affairs means an approach to prices prevailing before the Coal and Coke strikes.

An increasing number of furnaces are getting to work, and the indications are multiplying that the supply of Bessemer Pig is exceeding the demand. Valley furnaces are trying to effect sales on the basis of \$12 Pittsburgh, but find no encouragement at that price.

While Pittsburgh and Wheeling are firm for Steel Billets, other districts are taking what business there is coming up further West and in Cleveland. Chicago has taken quite some orders, and is aggressive and accommodating. Buyers of Soft Steel have played a waiting game for so long a time, with the odds against them, that many will only come in for future requirements when tempting concessions are made.

In Finished Iron and Steel there is a fair volume of business, but not enough to prevent pounding of values which are getting perilously close to the record. The railroads are becoming slightly more liberal buyers, but are still far below their normal requirements. Some shipbuilding work has been given out on the Delaware and a few good bridge contracts are in sight in different parts of the country.

Cincinnati, as the principal distributing point for Southern Iron, reports some good inquiries but at prices far below sellers' views. Ever so slight a feeler has some elements of encouragement.

There is talk of advancing freights on Finished Iron and Steel to Philadelphia, New York and Boston on September 1. It is reported, also, that rates on Southern Pig Iron are to be higher after that date.

Philadelphia.

Office of The Iron Age, 230 South Fourth St., PHILADELPHIA, Pa., August 21, 1894.

There is no very decided change in the character of the market, although there are indications of increasing activity. This is not due to anything in connection with the tariff, but to natural conditions which are beginning to assert themselves, although the trade feel relieved because they know just where they stand in regard to foreign trade. Beyond this there is no reason to suppose that the tariff will exercise any influence except in Tin Plates, Cotton Ties, and possibly in thin Sheets. If prices begin to advance it will be in order to watch foreign markets, but it is very improbable that prices will reach a point high enough to invite foreign competition, so that for the present the tariff is not likely to be much of a factor. The local trade, as already mentioned, is developing very satisfactorily. Buyers have about given up the idea of lower prices, so that they are taking larger lots and with less dickering, all of which is encouraging to sellers. The only weak spot seems to be in Finished Material, and that cannot last if prices of Pig Metal are maintained, but it is a fact nevertheless that rolled stock can be had at nearly as low figures as at any time during the earlier portion of the year. There is a much better demand, however, and as mills are moderately well supplied with orders there should be an improvement, unless Pig Iron becomes more plentiful and prices for that commodity something lower than they are at present.

Pig Iron.—Sellers say there is a much better demand for Pig Iron, but as yet it is difficult to get better prices. Those who ask an advance lose the business, but in some cases order books are in such condition that makers prefer to do that rather than accept medium or inside current rates. It is possible that buyers may have to give way, as a great deal of stuff is being taken, and if the demand can be maintained a week or two longer, quotations may have to be changed. It is very encouraging to note that sellers are beginning to assert themselves, but the contest is not decided yet, although a couple of weeks more may settle the matter. Bessemer is still scarce and in demand, with recent sales at about \$14, Philadelphia. Other general quotations for same or equivalent delivery are as follows:

Bessemer.....	\$13.75 @ \$14.00
Standard No. 1 Foundry X.....	12.50 @ 13.00
Standard No. 2 Foundry X.....	11.50 @ 12.00
No. 2 Plain.....	10.75 @ 11.00
No. 1 Soft.....	11.50 @ 11.75
No. 2 Soft.....	10.75 @ 11.00
Standard Gray Forge.....	10.50 @ 10.75
Ordinary.....	10.25 @ 10.50

Muck Bars.—Demand rather light, holders asking \$19.50, f.o.b., with sales at a trifle less money.

Steel Billets.—There is quite a scarcity for prompt shipments, and buyers have to pay \$19.50 @ \$19.75, and even then can only get small lots. For longer dates \$19 would be accepted, but there is very little new business, as prices are considered to be somewhat uncertain. The scarcity of water is said to be the primary cause, as without water they cannot keep up the supply of Coke, and without Coke there can be no Pig Iron, so that the scarcity of Billets is not so much on account of a big demand, but because of abnormal influences which can only affect the market temporarily, hence the unwillingness of buyers to trade on the basis of to-day's prices.

Finished Material.—There is a good demand and mills are maintaining their position very fairly. Prices are about the same as last week, but when special orders come in sight quotations have to be adapted accordingly. An order for about 1000 tons of Steel Ship Plates was taken at about 1.30¢ delivered Wilmington, and one for Iron Plates delivered at Chester at 1.35¢, although prices are generally supposed to be about a tenth above these figures, and for small lots they probably are that much better. The amount of work coming in is somewhat larger, and although there is nothing very important in sight, the indications are favorable for a continued good demand from consumers of the smaller class. General quotations are about as follows:

Grooved Skelp.....	1.25¢ @ 1.30¢
Standard Refined Bars.....	1.20¢ @ 1.25¢
Medium quality.....	1.10¢ @ 1.15¢
Tank Steel.....	1.35¢ @ 1.40¢
Heavy Plates.....	1.30¢ @ 1.40¢
Shell.....	1.50¢ @ 1.60¢
Flange.....	1.60¢ @ 1.80¢
Angles.....	1.40¢ @ 1.50¢
Beams and Channels.....	1.50¢ @ 1.60¢

Old Material.—The demand is improving, and for choice stock buyers are willing to pay more money. Supplies are less abundant than they have been, and the chance for better prices seems to be quite favorable, although as yet lots can be bought at about the following prices:

Heavy Melting Steel.....	\$10.50 @ \$11.00
Light Melting Steel.....	8.00 @ 8.50
No. 1 Wrought Scrap.....	10.50 @ 11.50
Machinery Cast.....	9.50 @ 10.00
Wrought Turnings.....	8.00 @ 8.50
Cast Borings.....	6.25 @ 6.75
Old Iron Rails.....	11.50 @ 12.00
Old Car Wheels.....	9.50 @ 10.00

Cincinnati.

(By Telegraph.)

Office of The Iron Age, Fifth and Main Sts., CINCINNATI, August 22, 1894.

There has been an increased production of Pig Iron in most districts and there has been no such advance in the value of the finished product as to justify the mills in paying an advance for Pig Iron. The demand during the week was mainly for Forge grades, and to effect sales of these lower prices had to be accepted. There were sales of 1000 tons Gray Forge and some smaller lots on the basis of \$6.50, f.o.b. Birmingham, but foundry grades are well sustained but quiet, there being only moderate sales of No. 2 Foundry at \$7.50, f.o.b. Birmingham. There were numerous inquiries for round lots, aggregating upward of 10,000 tons for forward delivery, but buyers' views are so far below those of sellers that there was little actual trading. There is not much demand for Charcoal Iron and there is little more than single car lots selling. There is a fair quantity of iron being melted by the Iron Pipe Works, but the jobbing foundries are doing only a moderate business in this district. The tone of the market in general is easy. Quotations are as follows:

Foundry.

Southern Coke, No. 1.....	\$10.50 @ \$10.75
Southern Coke, No. 2.....	9.75 @ 10.00
Southern Coke, No. 3.....	9.25 @ 9.50
Ohio Soft Stone Coal, No. 1....	14.50 @ 15.50
Ohio Soft Stone Coal, No. 2....	14.00 @ 14.50
Lake Superior Coke, No. 1.....	12.50 @ 13.00
Lake Superior Coke, No. 2.....	11.50 @ 12.00
Hanging Rock Charcoal, No. 1..	18.00 @ 17.00
Hanging Rock Charcoal, No. 2..	15.50 @ 16.00
Tennessee Charcoal, No. 1.....	13.00 @ 12.50
Tennessee Charcoal, No. 2.....	12.00 @ 12.50

Car Wheel and Malleable Irons.

Standard Southern Car Wheel	16.25 @ 17.00
Lake Superior Car Wheel and Malleable.....	15.25 @ 15.75

Forge.

Gray Forge.....	8.75 @ 9.00
Mottled Coke.....	8.50 @ 8.75

Chicago.

(By Telegraph.)

Office of The Iron Age, 59 Dearborn street, CHICAGO, August 22, 1894.

Pig Iron.—Trade has been fair the past week, but heavy buying seems to be over for the present. Carload lots are in good demand from the smaller foundries, which are gradually getting more work. Shipments are increasing rapidly and shipping instructions are now running ahead of terms specified in contracts. Merchants say if this continues at its present rate contracts will have to be increased and prices will be considerably strengthened. These remarks apply solely to local Coke Iron. Southern Iron is neglected, sales being confined to occasional carload orders. Lake Superior Charcoal is also quiet, but as car orders are now coming up it is expected that Wheel Foundry will soon be running on a larger scale, which will lead to a heavier consumption of Charcoal Iron. Quotations are given as follows for cash:

Lake Superior Charcoal.....	\$14.25 @	\$15.00
Local Coke Foundry, No. 1....	10.25 @	10.50
Local Coke Foundry, No. 2....	10.00 @	10.25
Local Coke Foundry, No. 3....	9.50 @	10.00
Local Scotch.....	10.25 @	10.50
Ohio Strong Softeners No. 1....	13.00 @	13.50
Southern Silvery, No. 1.....	.....	.....
Southern Silvery, No. 2.....	.....	.....
Southern Coke, No. 2.....	10.75 @	11.25
Southern Coke, No. 3.....	10.50 @	10.75
Southern, No. 1 Soft.....	10.75 @	11.25
Southern, No. 2 Soft.....	10.50 @	10.75
Tennessee Charcoal, No. 1....	.....	.....
Tennessee Charcoal, No. 2....	.....	.....
Alabama Car Wheel.....	17.50 @	18.00
Jackson County Silvery.....	15.25 @	16.00
Other Ohio Silvery.....	14.25 @	14.50
Coke Bessemer.....	11.25 @	11.50
Malleable Bessemer.....	10.50 @	11.25

Bars.—Sales have been quite light for some time, but inquiries are in the market for good speed lots. Car orders are cropping up and it looks as if quite a demand for Car Iron is to be expected at an early day. Prices are weak, and while mill shipments of Common Iron from Old Rail mixture are still quoted at 1.05¢ @ 1.10¢, Chicago, and Guaranteed Iron at 1.20¢, these rates could be easily shaded on good specifications. Soft Steel Bars are firmer than Iron, quotations being continued at 1.25¢ @ 1.30¢, Chicago, on strictly Billet stock. Jobbers quote small lots from stock at 1.25¢ upward for Iron and 1.35¢ upward for Soft Steel.

Structural Material.—Eastern concerns continue to capture the bridge orders coming up in the West. The Red Wing Bridge went to Toledo. Inquiries now are not large nor numerous. Plans are being prepared for a very expensive lift bridge to be built over the Chicago River by the Northwestern elevated. Beams for buildings are going in small lots only. Prices are fairly maintained, but concessions are occasionally made by one of the leading manufacturers in this line. Quotations on mill shipments, Chicago delivery, are as follows: Beams and Channels, 1.50¢; Tees, 1.65¢; Angles, 1.45¢; Universal Plates, 1.45¢. Small lots from stock sell at 1.75¢ for Beams and Channels; 1.50¢ @ 1.60¢ for Angles, and 1.70¢ @ 1.80¢ for Tees.

Plates.—Manufacturers' agents are not doing much, but dealers are enjoying a little better movement both on mill orders and store trade. Mill shipments, Chicago delivery, are quoted as follows: Tank Steel, 1.45¢ @ 1.55¢; Flange Steel, 1.65¢ @ 2.10¢; Fire Box, 1.65¢ @ 5¢. Store prices are as follows: Iron or Steel Sheets, Nos. 10 to 14, 1.80¢ @ 1.90¢; Tank Steel, 1.65¢ @ 1.85¢; Flange Steel, 2¢ @ 2.15¢;

Boiler Tubes, in carloads, 70 % @ 75 % off.

Sheets.—Several hundred ton lots of Black Sheets have been placed at about 2.35¢, Chicago, for No. 27 Common Iron and 2.45¢ for Steel. Galvanized Sheets are much more active, and mills are filling up fast. Everybody asks for prompt shipment, which few concerns are now able to promise. Mill shipments are quoted at 75 and 10 % and 10 % off, Chicago delivery. Sheet Copper stands at 14¢, with no discount. Small lots of No. 27 Common Black Sheets are quoted 2.60¢ @ 2.70¢, and Galvanized Sheets 75 and 5 % off.

Merchant Steel.—A few more good season contracts have been placed, but general trade continues small. Mill shipments, Chicago delivery, are quoted as follows: Smooth Finished Machinery Steel, 1.60¢ @ 1.70¢; Smooth Finished Tire, 1.60¢ @ 1.70¢; Open Hearth Spring Steel, 1.85¢ @ 1.90¢; Bessemer Machinery, 1.50¢ @ 1.55¢; Bessemer Tire, 1.40¢ @ 1.45¢; Ordinary Tool Steel, 5½¢ @ 7¢; Specials, 10½¢ and upward.

Billets and Rods.—Encouraging conditions are reported for both Billets and Rods, on which quotations are continued at \$18.25 @ \$18.50 for Billets, and \$25 @ \$25.25 for Rods.

Rails and Track Supplies.—Nothing special has developed in this line. Quotations are continued as follows: Standard Rails, \$25 @ \$27; Steel Splice Bars, 1.25¢ @ 1.35¢; Track Bolts, with Nuts, 2.10¢ @ 2.20¢; Spikes, 1.70¢ @ 1.80¢; Links and Pins, 1.65¢ @ 1.70¢.

Old Rails and Car Wheels.—Negotiations are proceeding for several lots of Old Iron Rails, but no sales are reported. Quotations are nominal at \$10 @ \$10.50 for Old Iron Rails, \$7.75 @ \$10 for Old Steel Rails, and \$10 @ \$10.50 for Old Car Wheels.

Scrap.—Transactions are few and small. Dealers quote the following selling prices per net ton: Railroad Forge, \$9; Dealers' Forge, \$8 @ \$8.50; No. 1 Mill, \$6.50; Pipes and Flues, \$6; Iron Axles, \$12.25 @ \$12.50; Steel Axles, \$12.75 @ \$13; Heavy Cast, \$7.50; Stove Plate, \$5 @ \$5.50; Cast Borings, \$3.50; Wrought Turnings, \$5; Axle Turnings, \$7; Fish Plates, \$10; Horseshoes, \$9; Mixed Steel, gross ton, \$5.50.

Metals.—Copper is somewhat stronger and carload lots of Lake are now quoted at 9.50¢, while Casting Copper is firm, at 9¢ for carloads or larger quantities. Spelter is quoted at 3.25¢, while Pig Lead is much weaker, being quoted at 3.15¢ @ 3.20¢.

Andrew Hawthorne, room 556, The Rookery, Chicago, sales agent for Matthew Addy & Co., advises the trade that the firm have been appointed selling agents for the entire output of the Lady Ensley Furnaces at Sheffield, Ala. These furnaces were blown in the past week and will run on Russellville, Ala., Ore and Horse Creek Coke for the purpose of insuring a Soft High Silicon Iron especially adapted to the wants of foundrymen in the Northwest.

The Lackawanna Iron & Steel Company of Scranton, Pa., record another banner record. The converting department of the South Works made in 11 turns during the week ending August 18 the enormous product of 5723 gross tons with two 9-ton vessels.

Louisville.

LOUISVILLE, KY., August 18, 1894.

There has been no change in prices and little disposition has been shown to increase orders on account of the expected early passage of the Tariff bill. Consumers find that the market for Finished Material is quiet, buyers desiring to only pay present prices and have not been able so far to secure an advance. Some orders are being placed by railroads for Cars, showing a stronger buying movement on the part of railroad companies than has been seen for some time, and Car shops that have been idle for a number of months expect shortly to start up. Among Pipe shops work has been active, and two large orders that Southern Pipe companies were asked to bid upon—viz., for Yokohama, Japan, and an Eastern order—they have been compelled to refuse to make bid for quick delivery. We quote for cash, f.o.b. cars Louisville:

Southern Coke, No. 1 Foundry.....	\$10.00 @	\$10.50
Southern Coke, No. 2 Foundry.....	9.25 @	9.50
Southern Coke, No. 3 Foundry.....	8.75 @	9.00
Southern Coke, Grav Forge.....	8.50 @	8.75
Southern Charcoal, No. 1 Foundry.....	12.50 @	13.50
Southern Car Wheel.....	15.00 @	15.50

St. Louis.

(By Telegraph.)

Office of The Iron Age, Bank of Commerce Building, ST. LOUIS, August 22, 1894.

Pig Iron.—The situation continues to improve, and sales are gradually increasing both in size and number. Consumers are disposed to anticipate their wants, and as a consequence sales of 100 ton lots are taking the place of carload orders. All the local stove foundries are running and nearly all the architectural works are fully employed. The resumption of work at the Madison Car Works will add a heavy consumer of Pig Iron to the local list. Prices are well maintained, and when they are shaded it is generally because the Iron is not up to the required standard. Sales during the week will aggregate several thousand tons, which were sold, generally speaking, at the prices as quoted herewith, which are for cash, f.o.b. cars St. Louis:

Southern Coke, No. 1 Foundry.....	\$11.00 @	\$11.25
Southern Coke, No. 2 Foundry.....	10.25 @	10.50
Southern Coke, No. 3 Foundry.....	9.75 @	10.00
Southern Car Wheel.....	16.50 @	17.00
Gray Forge.....	9.50 @	9.75
Ohio Softeners.....	14.00 @	14.50

Bar Iron.—There is no particular change to note in this department. Increased activity among the car builders is having a beneficial influence, and mills are now able to run pretty full. The local demand continues to improve. Mills quote 1.15¢ @ 1.20¢. Jobbers ask 1.30¢ @ 1.35¢, according to quantity.

Barb Wire.—There is a substantial demand from Texas and other Southern points, which gives evidence of continuing for some time. Prices are firmly held at \$1.85 for carload lots of Painted, with 40¢ per hundredweight for Galvanized.

Wire Nails.—The market is without feature at \$1.20. Nails seem stationary, although a local jobber is quoted as selling special trade at \$1.15. There

is no demand however, and a price of \$1 $\frac{3}{4}$ per keg would hardly secure any large business at this time.

Rails and Track Supplies.—At \$26 50 @ \$27 some few lots of Standard Rails have been bought, but in each instance the quantity was small. Old Iron Rails are neglected at \$10 @ \$10.50. Track supplies are looking up, especially Bolts and Nuts. We quote as follows: Splice Bars, 1.35¢; Spikes, 1.70¢ @ 1.75¢; Bolts, Square Nuts, 2¢; with Hexagon Nuts, 2.10¢; Steel Links and Pins, 1.60¢; Iron, 1.70¢.

Pig Lead.—It is hard to get two opinions which will agree regarding this metal. Some heavy sales for future delivery have been made at prices ranging from 3 27 $\frac{1}{2}$ ¢ @ 3 17 $\frac{1}{2}$ ¢. The market is feverish and very much unsettled. At the close to-day 3.20¢ was bid, while sellers were holding off for 3.25¢.

Spelter.—There is no change to note in this metal, except, perhaps, it is a trifle inclined to weakness. We continue to quote 3 15¢, but there is little or nothing doing at this writing.

Birmingham.

BIRMINGHAM, AUGUST 20, 1894.

The week has been very quiet. While there is general feeling of relief at the apparent settlement of the tariff question, yet the actual danger to Southern industries was less than to those of the North and East. Free Coal would have been felt most severely, owing to the possibility of putting Nova Scotia Coal on vessels and shipping at low rates to Southern competitive points, even though it be of much inferior quality. There is some danger from the reduced tariff on Pig Iron to Eastern points, yet our Irons have obtained such a strong hold there that it is doubtful if the effect of this will be felt until there is a decided improvement in prices.

The strike seems about over. The miners at Blocton and Pratt mines have agreed to the proposition of 37 $\frac{1}{2}$ ¢ based on a sliding scale of price of Pig Iron and have gone to work. The Tennessee Coal, Iron & Railroad Company has signed this scale and many of the small mines will follow. The Sloss Iron & Steel Company are dealing with their men individually and are getting a full output of Coal and Coke. There is still some little agitation at some of the non-union mines, but practically the strike is over. Demand is fair and prices show no change.

Pig Iron.—The market is fair though quiet. Inquiries are coming in in good quantity, but sales are confined mostly to small orders and few over three or four months ahead. Stocks show no increase. There is no eagerness to sell and quotations show about the same as last week: No. 1 Foundry, \$8 50 @ \$9; No. 1 Soft and No. 2 Foundry, \$7 50 @ \$8; No. 2 Soft, \$7 25 @ \$7.75; Gray Forge, \$6 75 @ \$7. While quotations may seem high to some, yet they represent actual sales, and sales reported at much lower figures are generally for off grades or due to special causes.

It is rumored that a combination has been effected at Sheffield and Florence which will start several furnaces there and will use Horse Creek and Birmingham Coke. Some further changes are reported in the Tennessee Coal, Iron & Railroad Company. The Blocton and Blue Creek mines have been placed under the management of J. Moore, formerly superintendent at Pratt mines,

and L. W. Johns is relieved. Erskine Ramsey is made superintendent at Pratt mines. Mr. Ramsey has been the engineer of the Tennessee Company and has been most closely identified with all the improvements made in the washing and coking of Coal by this company. His advancement is not only deserved but a decided benefit to the company.

The foundries and machine shops all over the district are filled up with sugar work for the Southern planters for six and eight months ahead. This industry has assumed very large proportions here, and considerable apprehension was felt as to the outcome of the tariff on sugar. The result has caused a great feeling of relief from all engaged in this work that it was not worse.

The Trussville Furnace is expected to be sold at the end of this month and will probably be bought in by Pennsylvania parties, who will remodel and run it.

New York.

Office of *The Iron Age*, 96-102 Reade street, New York, August 22, 1894.

Pig Iron.—This market fails to display any signs whatever of any improvement in volume of business. There is little inquiry, and that only for small lots. We note a sale of 500 tons of Bessemer Pig to an open hearth plant in this vicinity, the balance of the requirements of the year having been taken by a Lehigh Valley company. We quote standard brands \$12.50 @ \$13 for No. 1; \$11 @ \$12 for No. 2, at tidewater. Southern Iron, same delivery, \$11.50 @ \$12.25 for No. 1; \$10.50 @ \$11 for No. 2; \$10 @ \$10.25 for No. 3; \$10.25 @ \$10.75 for No. 2 Soft, and \$10.50 @ \$11 for No. 1 Soft. Foundry No. 4 (Foundry Forge) is \$9.75 @ \$10.25.

Cast Iron Pipe.—Some time since Albany called for bids for about 1600 tons of 30-inch Pipe, three concerns putting in bids. The awards could not be made then because the appropriation had not been formally passed. When that was finally done two of the bidders withdrew, so that the Anniston Works, through F. B. Hawkins & Co., of this city, took the order. The same firm has also closed for about 800 tons for Medford, Mass.

Spiegeleisen and Ferromanganese.—No new business is reported. Foreign is nominally \$20.50 @ \$20.75 for 20 % Spiegeleisen, and \$50 @ \$50.50 for 80 % Ferromanganese.

Billets and Rods.—The market for Domestic in this territory is dull at \$19 25 @ \$19 50, tidewater, for Billets, and \$26.75 @ \$27 for Wire Rods. The new rates of duty have no effect.

Steel Rails.—The only transaction reported is the sale by an Eastern mill of 1000 tons to the Elevated road of this city. The first feeler for next year's business has come in the West where a Southern road has asked for bids on 15,000 tons. There is some inquiry for relayers in New England. From Montreal comes the news that the record for low prices on English Rails in that market has been broken recently. A moderate lot was sold at \$19, delivered, Montreal. It is reported that English Rails have been offered as low as \$17, c.i.f. New York.

Track Material.—We quote as follows for small lots: Spikes, 1.50¢ @ 1.70¢; Fish Plates, 1.20¢ @ 1.40¢; Track Bolts, Square Nuts, 2¢ @ 2.10¢, and Hexagon Nuts, 2.10¢ @ 2.30¢, delivered.

Swedish Material.—It is believed that the lowering in duties will make it possible for importers to recover for Swedish material some of the ground lost to American makers of special Soft Steel. On Charcoal Bars and Billets the reduction amounts to \$10 $\frac{3}{4}$ per ton, while on Rivet Rods, &c., it is from 0.6¢ to 0.4¢ per lb. Rods can be laid down at about £7 15/, c.i.f. New York.

Manufactured Iron and Steel.—Current orders and inquiries are very light, and reports from Pittsburgh indicate that low prices are being made on Steel Bars. It is expected that freights will be advanced on September 1 from Pittsburgh. In Iron Bars a Western mill recently took orders aggregating 400 tons in this market. Inquiries made abroad concerning Cotton Ties show that the necessary prompt deliveries cannot be made to take any of this season's business. Foreign makers quote 66¢ per bundle, c.i.f. New York. The lowest point touched by Domestic Ties this season was 52¢ per bundle Pittsburgh. We quote: Beams up to 15-inch, 1.40¢ @ 1.50¢ for round lots; Angles, 1.30¢ @ 1.35¢; Universal Mill Plates, 1.25¢ @ 1.35¢; Tees, 1.50¢ @ 1.60¢; Channels, 1.40¢ @ 1.50¢, on dock. Steel Plates are 1.30¢ @ 1.40¢ for Tank; 1.40¢ @ 1.50¢ for Shell; 1.60¢ @ 1.65¢ for Flange, and 1.75¢ @ 2¢ for Fire Box, and 2¢ @ 2.25¢ for Locomotive Fire Box, on dock; Refined Bars are 1.25¢ @ 1.9¢, on dock, and Common 1.10¢ @ 1.20¢; Soft Steel Bars are 1.20¢ @ 1.30¢; Scrap Axles are quotable at 1.35¢ @ 1.50¢, delivered; Steel Axles, 1.35¢ @ 1.50¢, and Links and Pins, 1.40¢ @ 1.60¢; Steel Hoops, 1.40¢ @ 1.50¢, delivered; Cotton Ties, 70¢ @ 75¢ $\frac{3}{4}$ 45-lb bundle, tidewater; Machinery Steel, 1 20¢ @ 1.40¢; Toe Calk, 1.75¢ @ 1.90¢, and Sleigh Shoe, 1.60¢ @ 1.75¢, delivered.

Financial.

Although the fate of the tariff bill, now in the hands of President Cleveland, is not, at the time of writing, an absolute certainty, the opinion prevails very generally that the bill will surely become a law, either with or without the Presidential approval, and this assumption has induced the development of a better feeling in the financial and commercial world. The trade reports from various parts of the country mention signs of revival in many industries. Stocks of goods of all kinds, which were suffered to dwindle to the lowest ebb, are beginning to be replenished, and, although it is yet too early to look for the full effects of the removal of uncertainty, in a general business revival, the signs point to such an event as being within measurable distance. The season is, however, so far advanced that in several lines the fall trade is practically ended and the bulk of the business lost is gone forever. Yet there is a vast amount of business pending, which has been awaiting the settlement of the tariff question, and which will now undoubtedly be carried through. Therefore, while any great "boom" is unlikely, the probabilities appear to point to a considerably increased activity in trade and money circles—always barring the execution of a veto by the President.

A good symptom of business improvement is shown in the returns of bank clearings for the country at large, which, from the reports to the *Financial Chronicle*, actually exhibited for last week an increase of 10.9 % over the

amounts for the corresponding week of last year. Although the comparison is made with the panic times of a year ago, the fact still remains that the lowest point of depression is passed, and that recovery has begun. New York City is the solitary exception to the general increase, the clearings for this center showing a decline of 4.8 %, attributable to the smaller volume of Stock Exchange transactions as compared with the flurry of 12 months ago. At Boston the increase is 14.9 %, at Philadelphia 10.4 %, at Chicago 39.7 %, at St. Louis 35.8 %, at New Orleans 16.4 %, and at five other cities the gain averages 27.2 %.

Railroad earnings, according to the same authority, also reflect improved conditions following on the removal of tariff uncertainty, and appear to be growing better. For the fourth week of July the *Chronicle's* statement of earnings shows only 3.90 % decrease, against 12.41 % for the third week, 26.31 % for the second week and 32.26 % for the first week. For the first week of August the preliminary statement covering 70 roads shows only 1.24 % decrease, and no less than 38 of the 70 roads report an increase. The westward movement of merchandise is increasing in a marked degree, and although the Western cropsituation is not as favorable as could be wished, the railroads which handle grain appear to expect that the shortage in that traffic will be in a measure counterbalanced by a gain in the transportation of general merchandise. St. Paul's returns of earnings for the second week in August show a gain for the first time this year, and they are not far behind those of 1892.

The stock market, always sensitive, has felt the effects of the passage of the tariff bill in a decided renewal of activity in speculation. Trading, which, in the earlier portion of last week, was more or less confined to four stocks, namely, Sugar, Whisky, Burlington and St. Paul, in all of which large transactions were effected, broadened out toward the close of the week to a remarkable degree. The declaration on Friday of the full quarterly dividend of 1½ % by Burlington, and the good showing of earnings by the St. Paul road, caused a sharp advance, not only in the two roads named, but in the whole railroad list, many stocks scoring a substantial rise. On Saturday stocks were unusually active, and the week closed with higher prices all along the line, both in railroad and "industrial" securities. Missouri Pacific, Louisville, Rock Island, National Lead and General Electric in particular exhibited a remarkable recovery of strength and activity. The demand for stocks of established reputation having been greater than the supply, those of bankrupt railroads and several of the lesser known securities have been engaging the attention of investors for the first time for a long period. Although the current week has seen something of a reaction in the lessening of the volume of business in stocks, the market has maintained its strength and prices have remained at the higher level. Sugar and Whisky alone have attracted much attention, but the dealings in these manipulated stocks have been purely of a "professional" character. One thing has been, however, noticeable during the week under review, and that is the reviving interest taken in the market by the investing public. On Monday there were 113 different stocks dealt in, the widest distribution of business since

last year's panic. Bonds have also been active and higher.

Although this is the season when currency should leave this center, for the moving of crops, &c., the weekly statement of the New York banks, issued on Saturday last, shows a marked increase in the deposits, amounting to \$3,852,400. Loans increased by only \$1,676,100, although a more active demand for money was reported. The other changes were unimportant, the net result being an increase in the surplus reserve of \$803,800, which brings the sum held by the banks in excess of legal requirements to nearly \$68,000,000.

The loan market has been moderately active and is firmer in tone. Call money is still to be had at 1 % on the Stock Exchange, but banks and trust companies are asking 1½ % and in some cases 2 %. Time loans are in rather better demand, but the supply is ample for all present requirements. Lenders are, however, inclined to be somewhat more conservative. Rates are quoted at 1½ % @ 2 % for 30 and 60 days; 2½ % @ 3 % for 90 days; 3½ % @ 3½ % for 4 and 5 months, and 4 % @ 4½ % for longer dates. The market for commercial paper is active, and the offerings of good material are considerably better, rates being 3 % @ 3½ % for 60 to 90 day indorsed bills receivable, 3½ % @ 3½ % for 4 months' commission house names, 4 % @ 4½ % for first-class, 4½ % @ 5½ % for good 4 to 6 months' single names.

The market for sterling declined sharply toward the end of last week against a freer offering of bills against grain and cotton, but rates have stiffened this week, closing firm on Wednesday with a dearth of grain bills. Actual business was done at \$4.85½ @ \$4.86, for 60 days; \$4.86½ @ \$4.87 for demand; \$4.87 @ \$4.87½ for cables, and \$4.84½ for commercial. Domestic exchange on New York is quoted as follows: New Orleans, commercial 50 discount, bank par; Savannah, buying par, selling ½ premium; Charleston, buying at par, selling ½ premium; San Francisco, sight, 12½, telegraph, 15; St. Louis, par; Boston, 8 @ 10 discount; Chicago, 25 discount.

A considerable rise has taken place during the week in the price of silver, owing to an expected heavy demand from the belligerent countries in the East. Bar silver closed on Wednesday in London at 29½ pence, and in New York at 64½¢, nominal, ⅜ ounce. Shipments of the metal, amounting to over 600,000 ounces, have been made from New York during the past week.

The grain market has been strong and active, with higher prices for both wheat and corn, and expectations of a further advance in these cereals on diminished receipts and reports of curtailed crops.

Metal Market.

Pig Tin.—The record of speculative dealings during the week involves about 400 tons. Probably one-half as much has been done in 5 ton or larger lots outside of the speculative cliques, but those dealings were at least partially of speculative character and not without evidence that the peculiarities of the market have aroused a certain amount of interest in quarters where extreme conservatism was supposed to be strictly adhered to. It is a matter of fact that prices were run up to 19.60¢ for current month delivery, an advance of about 0.30¢; but the usual reaction has taken place, and at this writing

sales at above 19.35¢ for early deliveries were extremely difficult to make. In fact the market is laboring under the influence of tariff uncertainty and speculative manipulation that leaves ordinary calculations very much at a discount. Jobbers are therefore proceeding cautiously and consumers are quite as conservative, not only in dealings in spot stock but in venturing with future deliveries. Closing prices to-day were about 19.35¢ @ 19.40¢ net cash for round lots.

Copper.—There has been considerable effort in the direction of raising quotations, and the effort has been rewarded in a certain degree. By way of example, bids of 9.20¢ for Lake Superior Ingot were made where they would do the most good in a sentimental way and served to facilitate sales at 9½¢ or a shade less. Some accounts are that business has been done quietly at as low as 9¢ with consumers, in the face of the higher public bids above noted. It is remarkable that quotations on Electrolytic have been advanced to 8½¢ @ 9¢, and those for common casting stock to 8½¢ @ 8½¢, although no actual business, except in a retail way, can be traced at any advance over last week's prices. Apparently there is considerable maneuvering with a view to stimulating business on this side of the Atlantic and helping along a speculation in foreign markets. To all accounts, home consumers are liberally supplied with stock sent forward on previous orders, and it is plain that heavy consignments of late afford European buyers a full supply. Nothing new is divulged as to the efforts to effect a combination to restrict production and regulate prices.

Pig Lead.—There has been a gradual fall in prices due chiefly to more liberal offerings of stock for delivery during the next 30 days and somewhat strained reports sent westward as to probable importations of foreign Lead under the provisions of the new duty. Prompt shipments from the West went at 3.40¢ @ 3.45¢ laid down here, and September and later deliveries were offered at as low as 3.30¢ @ 3.35¢ without attracting much buying interest. In short, it has been a mean, narrow market from all points of view.

Spelter.—Purchases here have been strictly routine and moderate, all told. The demand has not improved. Deliveries are not particularly prompt and some receivers state that shipments hence from the West are annoyingly backward. Still, offers for near future delivery are made quite freely and it is no difficult matter to buy at 3.45¢ @ 3.50¢ for ordinary Western brands delivered here or at common point next month.

Antimony.—The market remains flat, there being merely routine consumptive demand, and prices are rather weak. Hallett's may be secured at 8½¢ @ 8½¢, and Cookson's at 9½¢ @ 10¢ on the spot.

Nickel.—No change of importance has taken place. Demand here is only fair and prices vary little from 40¢ for ordinary sized lots.

Tin Plates.—Quite a good business has been done in forward deliveries at prices based upon the new duty, with proper contract terms. The movement was chiefly in stock for delivery during the last quarter of the year, including Bessemer Coke finish at \$3.80 for 100 lb Siemens at \$3.90 @ \$3.95, IC Charcoals at \$4.65 @ \$4.67½ for ½ X assortment and other varieties at correspond-

ing prices. In spot goods the business has been moderate and prices for the same are as follows: Charcoal, Melyn grade, IC, \$6; do., Melyn grade, Crosses, \$7.75; do., Allaway grade, IC, \$5.40; do., Allaway grade, Crosses, \$6.45; do., Grange grade, IC, \$5.50; do., Grange grade, Crosses, \$6.60; do., Terne, M.F., 14 x 20, \$7.25; do., M.F., 20 x 28, \$14.50; do., Worcester, 14 x 20, \$5.70; do., 20 x 28, \$11; Alyn grade, 14 x 20, \$5.15; do., 20 x 28, \$10 @ \$10.25; D. R. D. grade, 14 x 20, \$4.90; do., 20 x 28, \$9.70. IC Coke: Penlan grade, \$5; do., J. B. grade, 14 x 20, full weight, \$5.15; do., 100 lb, \$4.75; do., 95 lb, \$4.62; do., 90 lb, \$4.55. IC Bessemer Steel, Coke finish: 14 x 20, full weight, \$5.12; do., 100 lb, \$4.70 @ \$4.75; do., 95 lb, \$4.60; do., 90 lb, \$4.50. IC Bessemer Steel, Coke finish, sq., \$5.30. IC Siemens Steel, Coke finish, sq., \$5.45. Wasters: S. T. P. grade, 14 x 20, \$4.60; do., S. T. P. grade, 20 x 28, \$9; do., Albearne grade, 14 x 20, \$4.90.

British Metal Market.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, August 22, 1894.

Pig Tin advanced sharply, or to the extent of £2. 10/ during the week, and transactions have been large. The advance is attributed to heavy purchases by the syndicate and prominent dealers, together with fair outside speculation, the passage of the American Tariff bill, the advance in Silver and lighter Straits shipments. American buying has been light. Prompts have sold at as high as £71. 15/. To day the market is strong, with Straits quoted at £70. 15/ for prompts, and £71. 5/ for three months' futures.

Copper has advanced somewhat, and the market is firm. Large purchases have been made by consumers, and speculation has continued active, being stimulated by more encouraging advices from America and reports that shipments hence will be lighter during the balance of the year. To-day the market is firm, with £40. 7/6 quoted for Merchant Bar prompts, £40 17/6 for futures and £42 @ £42. 10/ for best selected English.

Tin Plate has been in active demand from America and elsewhere since the passage of the tariff bill, but the prices offered were below makers' views, and only a fair business was effected. Some makers have advanced prices from 6 pence to 2 shillings, and it is impossible to quote values accurately at the present time. Swansea quotations to-day are about as follows:

Bessemer Cokes, 14 x 20.....	@ 10/
Siemens Cokes, 14 x 20.....	@ 10/6
Ternes, double box.....	@ 20/
Charcoals.....	11/ @ 14/

Pig Lead prices have hardened to £9 15/ @ £10 for Soft Spanish. Business only fair and the rise is due chiefly to prospects for American business.

Spelter is stronger at £15. 12/6 @ £15. 15/ for ordinary Silesian and in somewhat better demand.

Pig Iron warrants have been more active and prices have ruled somewhat

higher. Scotch realized as high as £4. 3/6, Cleveland £3 6/8 and Hematite £4. 5/ during the week.

A machine of a novel character is reported to have been introduced into the coal shipping business at Ashtabula, Ohio, which, it is thought, will revolutionize the lake coal trade. It is the property of the McMiller Car Dumping Machine Company of Cleveland, and is thus described: Instead of the old system of loading by means of buckets and rotary derricks, this machine, which has stood the test extending over several days of actual work, takes up a loaded car of about 23 tons' capacity and dumps its contents into the hold of a vessel, cars being handled at the rate of about 18 per hour. The loaded car is drawn high into the air on a cantilever, which is tilted by hydraulic power, the end containing the car being lowered through the hatch into the hold of the vessel. Chutes cannot be used in handling soft coal, as the great aim is to avoid breakage, which is reduced to a minimum with this machine. Cargoes aggregating as much as 3500 tons are loaded in a single day.

A new steamship company, to be known as the Philadelphia Steamship Company, have been established, says the *Shipping and Commercial List*, by Philadelphia capitalists. The Merchants & Miners' Transportation Company of Baltimore will co-operate in the new enterprise. The new line, which will run steamers between Philadelphia and Jacksonville, will be in operation in about a month.

Walter M. Stein, 325 Walnut street, Philadelphia, has received among other orders one from the Carbon County Improvement Company, Weissport, Pa., for a washing plant to suit small size anthracite and sand, and another from the McCreary Coke Company, Graceton, Pa., for a bituminous coal washery.

The New York *Journal of Commerce* publishes a statement of the dividends paid upon the last three months' business by the cotton mills of Fall River, which shows that out of 33 companies, with a combined capital of \$19,398,000, 7 paid no dividend, while the remaining 26 distributed among their stockholders \$259,000. Upon the entire capital the dividends average 1.29 per cent., or at the rate of 5 16 per cent. per annum, which, considering the times, is a very fair result and much better than many other branches of industry could show. The quarter's dividends of these companies, however, show a decrease of \$40,650 compared with the previous three months.

The Bureau of the American Republics has received information that the various States of Brazil are taking active measures to obtain labor from Europe and elsewhere. The Legislature of Para has authorized the Governor to enter into a contract for the introduction of 30,000 immigrants, and the State of San Paulo has just signed a contract for the introduction of 50,000 immigrants. The States of Bahia, Pernambuco, Alagoas, Rio de Janeiro and Minas Geraes are all moving in the same direction.

The Treasury Department has invited proposals for striking 23,757 medals as awards for exhibits at the World's Fair.

MANUFACTURING.

Iron and Steel.

The stockholders of the Colorado Fuel & Iron Company at their annual meeting, held at Denver on the 16th inst., elected the following board of directors: J. C. Osgood, H. R. Wolcott, Dennis Sullivan, W. H. James, C. H. Toll, J. L. Jerome, J. A. Kibbler, A. C. Cass, D. C. Beeman, W. L. Graham, Paul Morton, E. Thalman, G. H. Prentice. Mr. Osgood as president and the old Executive Committee were re-elected.

The Ashland Iron & Steel Company of Ashland, Wis., are making arrangements to blow in their Hinkle (charcoal) furnace on or about September 1. It has been out of blast for some six months.

The Linden Steel Company of Pittsburgh have made their semi-annual payments on the extension they received from the creditors last year. This shows a great amount of energy in such times.

It is stated that the Sharon, Pa., works of the American Steel Casting Company are preparing to resume operations.

The newly rebuilt nail and plate mills of the Ellis & Lessig Steel & Iron Company, Limited, at Pottstown, Pa., which were destroyed by fire in June last have been placed in operation.

The New Albany Steam Forge Works & Rolling Mill, at New Albany, Ind., have been sold at public auction to satisfy a mortgage of \$50,000. Alexander Dowling bought the plant on behalf of the bondholders for \$25,000. The works, which cost \$100,000, have been idle for three years, and for several years prior to their shut down are said to have been operated at a loss. It has not been determined what disposition will be made of them. It would cost considerable to repair the plant ready for operation.

The Pennsylvania Steel Company are now preparing the iron work for the new tinning plant which the Lalance & Grosjean Mfg. Company will erect in connection with their rolling mill, at Harrisburg, Pa. The new structure will be 60 x 120 feet in size.

The Roanoke Rolling Mill, Roanoke, Va., has been sold at a commissioner's sale and purchased for \$25,000 by Samuel Crozer, president of the Crozer Steel & Iron Company. Liens were held against the property amounting to about \$68,000, and the trustees of the sale were L. A. Cocke, W. A. Glasgow, E. W. Robertson and W. W. Berkeley. The plant will very probably be put in operation at an early date, as it is now in the hands of a company who, it is stated, can use it to advantage when the condition of business justifies it.

Orlando Harvey, who was recently appointed Master to look into the advisability of selling the large Wellman iron and steel plant, has asked the Court for time for another hearing. The Judge refused the hearing and ordered Mr. Harvey to have his report ready to submit to the Court by the first Monday in September. This means that a speedy sale will be made of the plant, and it is more than likely that it will get into hands that will start up this large industry. This will be a great boom for business in Chester.

Machinery.

R. R. Howell & Co., 200 and 202 West avenue, north, Minneapolis, have finished the rebuilding of their factory at Prospect Park, which was burned a few weeks since. The new structure is a substantial brick building, three stories high, 100 x 60 feet, with a foundry in a one story extension 60 x 60 feet. The main part of the works is occupied as a machine and wood working shop. The firm make a variety of products, comprising engines, saw mills, well machinery, pumps for driven wells, elevator machinery, roller mills, &c. They have recently given much attention to the casting of chilled rolls for roller mills as used in grinding flour and report that they have met with entire success in securing a proper mixture of irons and devising a process for satisfactorily casting the rolls. Six separate catalogues are issued to cover all the lines made by the firm.

The Waterous Engine Works Company, whose plant at South Park, St. Paul, was recently burned, are arranging to rebuild on a much more extensive scale on what is known as the West Side Levee, St. Paul, near the Robert Street Bridge. Their plants

contemplate a main building, 300 x 75 feet; blacksmith shop, 100 x 50 feet; foundry, 150 x 50 feet. These will be arranged around three sides of a square. The heavy machinery will be installed in the main building, which will have a large traveling crane running its full length. The company make a specialty of fire engines and apparatus and clutch pulleys.

The iron and brass foundry of William Moritz, at Hastings, Neb., was burned on the 10th inst. The loss is about \$5000 with insurance of \$3000.

The Oil City Tube Company, Oil City, Pa., have opened a branch office in St. Louis in the Laclede Building. H. H. Kinter is in charge, and reports a fair amount of business moving. The Oil City Tube Company are manufacturers of steam, gas and water pipe, boiler tubes, tubing, casing, line pipe and drive pipe.

The Rice & Sargent Engine Company of Providence, R. I., have received an order for the steam engine to be used in the new and extensive plant of Howard & Bullough American Machine Company, manufacturers of cotton machinery, at Pawtucket, R. I.

The Mortz Foundry & Machine Works, at Hastings, Neb., consisting of a two-story frame building 60 x 75 feet, with adjoining engine room, all valued at \$6,000, have been destroyed by fire.

A building permit has been taken out for a two-story frame and iron machine shop, 100 x 66 feet, as an addition to the Hoopes & Townsend Bolt Works, Hamilton and Broad streets, Philadelphia.

Kimball Bros. & Co., Brockton, Mass., formerly well known as builders of tack and shoe nail machinery, have associated with them H. F. Southworth of the late Brockton Machine Company, also experienced and well known in this line of manufacture, and are now prepared to turn out from new patterns the latest improved tack and shoe nail machinery.

The Schuylkill Foundry & Machine Works, Conshohocken, Pa., have received the following orders for Wood's water tube fuel saving safety boilers: 500 horse-power for the E. & G. Brooke Iron Company, Birdsboro, Pa.; 500 horse-power for I. Wood & Bros., Conshohocken, Pa.; 500 horse-power for Ellis & Lessig, Pottstown, Pa.; 600 horse-power for Duncannon Iron Company, Duncannon, Pa.; 500 horse-power for the Jenkintown Electric Light Company, Philadelphia, Pa.; 500 horse-power for the Philadelphia Flour Milling Company, Philadelphia, Pa.; 400 horse-power for the Belvidere Electric Light Company, Belvidere, N. J. Mr. Wood reports that his works at Saginaw, Mich.; Zanesville, Ohio, and St. Louis, Mo., are doing a large business building these boilers. As most of the above rolling mills have given up puddling these boilers are put in for economical and safe firing.

The Brown & Sharpe Mfg. Company of Providence, R. I., resumed work in all departments of their establishment at the close of their usual annual vacation, Monday last.

The Cleveland Foundry Company, Cleveland, Ohio, have opened a branch at 25 Lake street, Chicago, for the benefit of their Western trade. Warren McArthur is manager. On September 1 the company will establish a New York office at 107 Beekman street, Herman Watterman manager. Mr. Watterman was for several years with the Central Oil Gas Company.

The Spicer Mfg. Company of New Philadelphia, Ohio, have closed a contract with the Whittaker Iron Company, Wheeling, W. Va., for two mechanical dragouts, to be placed in their new mill. One is to be operated in connection with their finishing rolls for sheet bar, the other with their muck rolls for muck bar. The bosh tubs, one for each train, are to be made of steel, 18 feet long, 60 inches wide, 30 inches deep. Both dragouts are to convey the iron from the rolls to a large double specially designed shear made by the Totten & Hogg Iron & Steel Foundry Company, Pittsburgh, Pa. A dragout similar in construction to the above has been in successful operation for the past year in the plant of the New Philadelphia Iron & Steel Company.

Hardware.

The Sweatt Mfg. Company of Minneapolis, Minn., are among the few concerns which have been able to run nearly on full time this year. They make wheelbarrows their leading specialty, although they also

give some attention to factory trucks, hose reels, mortar hods, snow shovels, &c. The wheelbarrows are fitted with Hubbard's patent steel wheel, made in their own factory by an interesting process. This wheel consists of a rim made of flat bar steel, wire spokes made of heavy spring steel wire and a hub made of a short piece of gas pipe, with malleable collars at each end to which the spokes are fastened. After the bar steel is welded for the rim, the hoop thus made is placed under a punch which forces a small portion of the metal inward, making a loop to hold the spokes. The wire for the spokes is bent in a forming machine into almost a V shape, the point of the V being intended to rest in the loop on the rim while the ends extend to the sides of the hub. The wires are attached to the hub by passing through holes and being bent over, and the wheel thus formed is comparatively light, but strong and very stiff. Another special feature of these wheelbarrows is the patent tray of the dumping barrow. This is termed Sweatt's barrel tray, being made of staves so shaped that when bolted together they form a perfect dish shaped tray. The staves are held in place by long dowel bolts, which pass through the several pieces and are then drawn closely together by bolts. The factory is operated by steam power, and is well arranged for the handling of material, which passes steadily forward until all parts are assembled in the warehouse. This is in the second story of the building and is served by a large elevator. The works are located at Twenty-sixth street and Third avenue, south, and are connected with the Chicago, Milwaukee & St. Paul Railroad by a track which runs into the shipping department. W. R. Sweatt is secretary of the company and A. O. Hubbard is superintendent.

Announcement is made in the local papers of Louisville, Ky., that the Consolidated Steel & Wire Company have purchased a large lot at Fifteenth and Rowan streets in that city on which a warehouse is to be built. It is to form the distributing point in the South for the company's goods.

American Flexible Wire Company have been organized at Fort Valley, Ga., with a capital of \$20,000, of which \$5000 has been paid in. The company will manufacture wire goods, chiefly a patented wire plow and grazing line and halter. The officers of the company are S. F. Dasher, president; J. A. Spain, secretary and treasurer, and Peter J. Herrman, superintendent. The company expect to commence operations in a few days.

The St. Louis Washer Company, Twenty-first and Papin streets, St. Louis, Mo., are issuing a circular to the trade which reads as follows: "We beg to advise you that we have just opened our new and extensive plant at Twenty-first and Papin streets for the manufacture of standard size wrought and steel washers. The increased facilities which are now at our command enable us to execute all orders for washers with which we may be favored with the utmost promptness." In addition to standard size washers this company are in position to make special sizes of washers to order.

Lavigne & Scott Mfg. Company, manufacturers of hardware and special machinery, New Haven, Conn., have bought the commodious brick factory situated on River street, that city. The building is two stories, 120 x 40 feet, and will be fitted up for immediate occupancy. This move is made especially to accommodate the large demand for their improved Clark's pattern expansive bits.

The Weiner Mfg. Company, Newark, N. J., have been incorporated by Oscar Weiner and others to manufacture hardware and saddlery. The capital stock of the company is \$100,000.

The Buchanan Brass Hardware Company, Buchanan, Va., have been organized, and will commence operations October 1.

The Casler-Alton Company of Cleveland, Ohio, are a concern who have recently been organized. The company will manufacture hardware specialties, and are capitalized at \$10,000.

The Ette & Henger Mfg. Company, St. Louis, are issuing a pamphlet to be inserted in their Catalogue No. 3. The pamphlet consists of eight pages, and contains descriptions and prices of grindstone fixtures, shoe lasts, lap lasts, flower pot brackets, Japanese lawn sprinklers, hose pipes and blind hinges. Particular attention is directed to their line of shoe and lap lasts, which are made in a number of sizes and at low prices.

Miscellaneous.

The E. T. Harris Company, Laflin and Fifteenth streets, Chicago, made an assignment on the 16th inst. in favor of Walter Hill. Ornamental wrought iron work is the specialty of this company, and for years they have done a large business in various sections of the country. The assets are estimated at \$70,000 and the liabilities at \$60,000. Inability to collect on outstanding contracts is given as the cause of the failure.

The Wagner car shops, at East Buffalo, N. Y., have closed down on account of lack of orders. In prosperous times 1000 men are employed.

Following the order for a 60-gallon steam jacketed kettle for the cruiser "San Francisco," the Illinois Pure Aluminum Company of Lemont, Ill., have received another order from the Navy Department for a similar kettle for the battle ship "Montgomery."

PERSONAL.

J. F. Wilcox of Pittsburgh has gone to Germany.

O. J. Edwards, who has been secretary and director in the Hartman Mfg. Company of Ellwood City and general manager of the Ellwood Shafting & Tube Company, has transferred his interests to the U. S. Projectile Company of Brooklyn, N. Y.

Orders have been received at the Brooklyn Navy Yard that the new engines for the "Chicago" are to be built there. The yard presents just now a scene of unusual activity. The docks are full of ships, and all the departments are busy. Among the commissioned vessels now undergoing repairs or overhauling are the "New York," the "San Francisco," the "Cincinnati," the "Vesuvius," the "Bancroft" and the "Dolphin." In addition, the "Maine," the "Lancaster," the "Machias," the "Castine," the "Puritan" and the "Terror" are preparing for commission.

Considerable uncertainty having been felt by importers in regard to the standing of goods now in bond under the new tariff law, Custom House authorities have given as their opinion that dutiable goods withdrawn after the new law becomes operative will pay the new rates, but goods made free by the new law will have to pay the duties existing at the time of their importation.

United States Consul Smyth, at Cartagena, Colombia, has informed the State Department of the completion and opening of the Cartagena-Magdalena Railroad, which runs south through the Republic of Colombia for a distance of 60 miles to the town of Calamar. The railroad, which has been built by American enterprise, is expected to revive the former importance of the port of Cartagena, which has one of the best harbors on the South American Coast.

An aluminum pontoon is being experimented with in the German army. The whole apparatus can be readily carried by four men.

A contract for what is said to be the largest sailing vessel in the world has been recently given by a Hamburg firm to J. C. Tecklenborg, a Bremerhaven shipbuilder. The vessel will be constructed of iron and will have five masts. Her dimensions are to be as follows: Length, 365 feet; breadth, 50 feet, and depth, 31½ feet.

HARDWARE.

Condition of Trade.

SINCE our last a better feeling has pervaded the whole trade. Travelers are sending in more favorable reports and orders have been more numerous and for larger quantities. If this improvement should continue the fall trade will turn out much better than seemed probable a short time ago.

Chicago.

(By Telegraph.)

The Shelf Hardware trade shows some improvement. The demand for fall and winter goods now begins to figure in the orders received. Stove Boards, Coal Hods, Elbows and Stove furniture generally are moving to some extent, but not in large lots. Orders are small and almost invariably call for broken packages, causing much trouble and expense in packing departments. House furnishing goods are also in greater demand in the aggregate, but are called for in the same way in broken packages. Staple goods are picking up, but little inclination is shown as yet to lay in stocks or anticipate wants. The small size of the orders shows that goods are only being bought to meet the current demand, but the increased volume of business shows that the demand is steadily growing. Imported Tin Plate is advancing in price. Brokers' quotations for Chicago delivery, subject to duty, are about 30 cents per box above recent prices. Roofing Tin is in excellent demand, as well as Sheet Copper for cornice work. The Heavy Hardware trade runs along in fairly good condition. Orders in this line are also small, but latterly a tendency is shown to inquire for prices on larger lots, as though some consumers were getting the opinion that it would be a good time to lay in stocks of staple sizes and brands.

St. Louis.

(By Telegraph.)

There is a decided increase in the number of orders received this week in comparison with last. The settlement of the tariff question has evidently had a beneficial effect. While there is an improvement in the West and Northwest, the movement is more pronounced in the South, and indications point to the heaviest fall trade from this section that has been experienced in years. St. Louis claims to be in a position to handle the Southern trade better than any other city, and the fact that business from the South continues to increase every year is evi-

dence that the advantages of St. Louis are thoroughly recognized. Jobbers are gradually increasing their stocks, and while they admit the first half of the year has not been satisfactory, yet the indications point to an exceedingly heavy fall trade, which it is expected will more than counterbalance the first half of the year. Prices are, generally speaking, well maintained. Wire Nails are a trifle weaker, but there is very little business doing in them. An increased demand is noted for staples, and a heavy trade in Builders' Hardware is also one of the features of the market.

Notes on Prices.

Wire Nails.—Since our last several mills have started and others are reported as preparing to go into operation. The demand is good, but this has had no effect in advancing prices. Carload lots at mill have been sold quite freely at \$1 @ \$1.05. The New York price for small lots is \$1.20 @ \$1.25.

Chicago, by Telegraph.—Manufacturers' orders have increased heavily within the past few days. Their business is coming in from all directions except this immediate vicinity. Buyers here are still holding off and trying to secure lower prices. Their chances, however, are not so good as at times in the past. The long stoppage of the factories has pretty thoroughly cleaned up stocks and it seems as if the country generally is bare of goods. Few of the factories are in operation, as some ran but a short time last week and closed again for various reasons. Manufacturers assert that more business is in sight than at last year at this time, with practically no stocks to draw upon. They quote \$1.15 to \$1.17½, Chicago. Small lots from stock sell at \$1.20.

Cut Nails.—In this line both demand and production are increasing, but without improving the tone of the market as far as prices are concerned. We quote as representing the Eastern market 90 to 95 cents for carload lots on dock. The store price for small lots in New York is \$1.05 to \$1.10.

Chicago, by Telegraph.—Orders are small and only intended for sorting up. Manufacturers in this line have not yet begun to feel the movement of fall trade. Quotations are steady at 95 cents, Chicago, for 60 cent average. Small lots from store are selling at \$1.10 to \$1.15.

Barb Wire.—The Eastern demand continues very small, but reports from

the West are more encouraging. In prices the market shows little strength. The following are the quotations for Four Point Galvanized delivered at the points named: Pittsburgh, \$2 to \$2.05; Cleveland, \$2.05 to \$2.10; Cincinnati or Allentown, \$2.20 to \$2.25; Chicago or New York, \$2.20 to \$2.25.

Chicago, by Telegraph.—Jobbers are having a steadily increasing demand. Manufacturers seem to be waiting until trade grows to larger dimensions before they resume operations to any extent. Large factories are closed down, and give no sign of starting. Prices are firm, and large buyers acknowledge that they have been unable to secure concessions. Jobbers quote small lots of Galvanized at \$2.35, with 10 cents off for carloads.

Wrought Iron Pipe.—This line of goods seems to be suffering a reaction from its recent strength. Orders are not very plenty and manufacturers are pressing on the market. As a result prices have softened about 5 per cent.

Sturges Steel Churn.—This Churn was described in our last issue. It is manufactured by the Chicago Stamping Company of Chicago. The Churn is sold to the trade from the following list, subject to a discount of 20 per cent.:

No. 1, 9-gallon Churn, churns from 1 to 4 gallons of cream.....	\$6.00
No. 2, 15-gallon Churn, churns from 2 to 7 gallons of cream.....	9.00

Bread and Cake Knife.—Aluminum Novelty Company, Canton, Ohio, are putting on the market Ball's Diagonal Corrugated Bread and Cake Knives, a description of which was given in our issue of 9th inst. The Knives are sold to the trade at the following prices, which are net:

	Per doz.
No. 1, Bread Knife, polished steel blade.....	\$1.50
No. 3, Bread Knife, nickel plated blade.....	1.80
No. 4, Cake Knife, nickel plated.....	1.50

Acme Steam Glue Pot and Stand.—Stuart & Peterson Company, Burlington, N. J., are manufacturing this article, which was described in our last issue. It is sold from the following list, which is subject to a discount of 10 per cent. to the trade:

	Each.
No. 1, holding 1 pot.....	\$9.50
No. 2, " 2 pots.....	16.50
No. 3, " 3 ".....	25.00
No. 4, " 4 ".....	32.00
No. 5, " 5 ".....	39.00
No. 6, " 6 ".....	47.00
Glue Pots without frame.....	5.25
Inside Kettles, holding 5 quarts.....	1.35

Auger Bits.—The Ford Auger Bit Company, Holyoke, Mass., announce that their discount to retailers on Ford

Auger Bits is now 35 and 10 per cent., instead of 25 and 10 per cent. as formerly.

Wrought Brackets.—The wrought Steel Shelf Bracket manufactured by the Stanley Works, New Britain, Conn., and 79 Chambers street, New York, an illustrated description of which was given in *The Iron Age*, August 16, 1894, is sold at a discount of 70 and 10 per cent. from the standard list of cast Brackets.

Extension Rule.—This rule was described in our issue August 9, as put on the market by the Ranson Hardware Company, Burlington, Vt. It is sold from the following list, subject to a discount of 25 per cent. to the trade:

	Per dozen
No. 384, 38 inches, extends to 72 inches.....	\$16.80
No. 386, 62 inches, extends to 120 inches.....	27.60
Trimings only.....	9.00
Extra Rules, 38 inches.....	4.20
" 62 ".....	9.60

Glass.—No change of importance has taken place in the Glass market during the past week. Demand continues light and prices unsettled. Although there have been two conferences between the wage committees of the manufacturers and workmen, no agreement has been reached as to the wage scale for the ensuing fire. It is reported that neither committee is willing to sign an agreement until the fate of the tariff bill is known; also that the workmen appreciate the fact that they will have to accept some reduction in wages when the Senate tariff measure becomes a law. Conservative jobbers are not making large purchases at current quotations, and in Glass circles it is generally supposed that factories will make an early start. The New York market is represented by discounts of 80 and 20 to 85 per cent. Pittsburgh factory quotations in car lots are reported as being 85 and 5 per cent. for single and 85 and 10 per cent. discount for double strength Glass, while Pittsburgh prices for small lots of Glass are 80 and 10 per cent. for single and 80 and 20 per cent. discount for double. Imported Glass is still quoted at 80 and 10 per cent. discount.

The Portland Dinner of the New England Iron & Hardware Corporation.

A COMPLIMENTARY DINNER was given on Tuesday by the Portland Hardware and Iron merchants to the members of the New England Iron and Hardware Corporation and their guests. In extending this hospitality the following houses united: E. Corey & Co., Smith, Tibbetts & Co., the Emery-Waterhouse Company, A. E. Stevens & Co., Edwards & Walker and Kendall & Whitney.

The arrangements for the day were under the charge of the following com-

mittee: William Chamberlain, Eben Corey and Brice M. Edwards, to whose care and efficient direction the success of the meeting was largely due.

Some of the members and guests came from the mountains to attend the dinner, but most of them arrived on the 11 o'clock train from Boston. On arrival they were met by the committee and given a drive through the city and taken to Fort Allen Park for a view of Portland Harbor and Casco Bay.

The steamer "Madeline," which had been specially chartered, was then taken for a sail in the bay and among the islands, landing the party at Great Diamond Island, where dinner was served in the Portland Club House. In this way the guests were given something of an adequate idea of the extent and beauty of Portland's famous harbor.

Eben Corey of the local committee presided gracefully at the dinner, which was a most excellent one, to which full justice was done. At its close Edwin L. Haley, president of the Corporation, took the chair, making an appropriate address, and called upon Charles Clark Adams to act as toast master, a position which Mr. Adams filled in his peculiarly happy way.

There were no formal speeches, but brief addresses were made by the following gentlemen: Rev. W. H. Bolster, C. R. Milliken, S. A. Bigelow, R. R. Williams, H. P. King, Samuel M. Nicholson, Charles H. Bolles, J. B. McKay and William Chamberlain. Letters of regret were read from C. H. George & Co., and Belcher & Loomis of Providence.

The party then returned to the city to take the evening train, with mutual expressions of satisfaction in view of the success and pleasure of the day.

The United Indurated Fiber Company's New Works.

OUR READERS will remember that in July, 1893, the plant of the United Indurated Fiber Company of Lockport, N. Y., was completely destroyed by fire. Immediately after the fire a new location covering some 14 acres was purchased, adjoining the old plant, and the work of rebuilding was immediately gotten under way, plans being laid for a plant which should be sufficient for the growing demands for Indurated Fiber Ware. The buildings are entirely built of stone, and, with the exception of two of the 13 buildings, are all one-story, and are so arranged that the product is passed from one to the other as it goes through the different processes, thus reducing the handling to a minimum. Each department or process is in a different building, and the buildings are so arranged that with any possible increase of demand extensions can be made in each department. The company utilize in their pulp mill about 1000 horse-power, which they derive from the overflow of the Erie Canal at this point and which is

known as the 18-Mile Creek. In addition to this water power the company have a steam plant, comprising a Corliss engine, 250 horse-power; one Poppet valve engine, 175 horse power; one Armington & Sims, 75 horse-power, for the electric light plant, and two smaller engines of 50 horse-power. The company's boiler plant is of a capacity of from 400 to 500 horse-power. All of the waste steam is used in drying the product of the company, the exhaust being circulated through large coils and air is driven through these coils and into the dry ovens. In the manufacture of Indurated Fiber Ware hydraulic pressure is largely used, and to generate this pressure the company have a Worthington steam pump of a capacity of 1,000,000 gallons daily. In addition to this they have two smaller power pumps of a capacity of 250,000 gallons. The hydraulic pressure is kept up to from 150 to 200 pounds. The plant throughout is of what is known as "mill construction" and the apparatus for protection against fire is most complete and will be of interest. In addition to the water supply referred to above, an auxiliary pump, which is used exclusively for fire protection, is stationed in the engine room. This pump has a capacity of 800,000 gallons and connects not only with the city water mains, which at this point give a pressure of 125 pounds, but may also be readily connected with two tanks for auxiliary fire protection, holding 100,000 gallons. The entire plant is sprinkled, the equipment comprising something like 2000 sprinklers. Scattered around the works are ten outdoor hydrants, each fitted with a length of hose, and the company have a hose cart and extra hose on the grounds. Located in different points throughout the building there are 24 indoor hydrants with hose attached. The buildings cover in the neighborhood of 5 acres of ground. The company employ from 250 to 300 hands and turn out 1000 dozen articles of the various shapes and sizes manufactured in their ware per day. The description of this extensive plant will be of interest as showing the developments of this line of manufacture, which promises much for the future. The new line of goods to which the attention of the trade has been lately called—namely, Wash Basins and similar goods—will, it is believed, have a decided effect upon the trade in these lines. In spite of the depression of the last year the company report that they have been able to keep the works running full since they started in January last, and in some of their lines there has been a decided increase in the demand, while there has been no falling off in the demand for their staple goods. The officers of the company are Jesse Peterson, president; Henry G. Cordley, secretary; James E. Hayes, treasurer; Charles E. Folger, assistant treasurer. Cordley & Hayes of 172 Duane street, New York, represent the line in the East; the Indurated Fiber Ware Company of 55 Wabash avenue, Chicago, representing the company in the West.

THE CHAS. PARKER COMPANY, Meriden, Conn., who make a large line of Hardware, including the well known Parker Vise, have recently prepared a very handsome show card, which they offer to send to any dealer who will ask for it. This concern report a growing demand for their Columbian Coffee Mill, which is put on the market as a superior article at a moderate price.

Letters from the Trade.

Our readers are invited to discuss in these columns questions of trade interest connected with the manufacture or sale of Hardware. We shall be pleased to have a free expression of opinion on subjects deserving the attention of Hardware merchants and manufacturers.

Drafts.

There is a good deal of difference in the way in which the trade receive drafts made upon them by parties to whom they are indebted. A method of collecting has become much more general than a few years ago. We presume that some of our readers can appreciate what our correspondent, who is a retailer from Indiana, says:

I shall never forget my feelings when the first draft was made on me. I handled a few groceries and a little Hardware, and one of my grocery bills had run over time a few days. I had the money, but I expected the traveling man around and would have paid him; but along came notice that a house at Fort Wayne had drawn on me!

Dogged if I wasn't frightened. I thought I was just the same as sued and disgraced, and I could hardly sleep that night. The next day I got notice from the express agent that he had the draft. I paid it and was relieved to find this ended all proceedings against me.

Then I sat down and I gave that concern the doggonest hauling over the coals for their meanness, and told them I'd never buy another dollar of them; and dogged if I ever did. I afterwards inquired into the drawing business and found it was not such a very awful thing. But I never forgave that house.

A Traveler's Letter.

The following letter, which is a little out of the line of ordinary trade topics, is from a man who has traveled widely in many sections of the country and is doubtless well known to many of our readers:

There is a deal of difference in hotels and landlords North and South, said a traveling man who had just been telling the listener of his last trip.

It costs more to travel down South. Railroad fares are larger, hotel rates are higher. I can get common hotels all over the North to-day at \$1.50 to \$2. In the South rates are \$2.50. Up North a small hotel will take a farmer at \$1 and charge a traveling man \$2. Down South the ordinary man pays \$2.50, but when the landlord learns you are a drummer the price drops to \$2.

They have more confidence in the traveling public down South. You can get a check or draft cashed without calling out the militia. Out West they feel that a man ought to be arrested if he asks any one to cash a draft.

On my last trip I was getting rather low in money and had written the house to send me some to Jacksonville. I was afraid, however, that I had miscalculated and that I would not be able to hold out. At my last stop I was fearful that if I paid hotel bills I wouldn't have enough to buy a ticket to Jacksonville, so I concluded to make sure. I asked the landlord, before I registered, what my railroad ticket would cost; he said about \$8. "Then," said I, "I can't stop with you." "Why not?" he asked. "Because I'm short of money and will not get any till I get to Jacksonville. I've

got to get a lunch at the grocer's!" "You're not going to do anything of the kind," said he. "You write your name and stay right here." I thanked him, but said I could get along the other way and come out even; but he would not listen to it. Said he: "You shall stay right here; when you get to Jacksonville you can send me the amount of your bill, if you want to. If you don't, I can stand it." I thanked him, and said I would stay. I afterward got a ticket for \$4. so I was able to pay mine host, but I am under just as much obligation to him. He meant every word he said.

Another thing about the South. You have to pay 15 cents for a shave. Isn't that odd. The listener said: "Do you mean to say you get hotel rates anywhere in the North and West at \$1.50?"

"Yes, sir; and often at \$1. Of course you New York men would not stop at these houses, but they are clean and all right, and as I have to pay my own expenses I have to economize these days. They are second or third class hotels, as hotels are rated by drummers, but business is no better than that, and I find a clean bed, a fair table, and the landlord, who is his own clerk, always accommodating. You don't get style and don't have to pay for it. My hotel bill North and South will not average \$2 a day."

Discourteous Clerks.

The W. Bingham Company's "Man in the Corner" makes the following pertinent remarks regarding discourteous clerks, in their August circular to the trade:

I do not know of any one thing that will bring greater discredit upon a store than habitually careless or indifferent service behind the counter. A customer may think that a poor article is an accident or a high price a mistake, but boorishness or inattention is a personal affront which he will resent all the more because he has no direct redress. The next time he wants anything he will go to another store for it and will have a feeling of satisfaction in the thought that his money isn't going into the hands of the man who offended him, particularly if he meets in the second store with the deference due to one who has money to spend and patronage to bestow. If he stops to reason the matter out he will do it thus. "Stores live by the will of the people. I, when I have a want to fill and money to spend, represent in my person the purchasing public and am entitled to consideration as a patron. To the man whom I address my desires should be, for the moment, of paramount interest, whether I want to stock a store or to buy two Brass Rivets of impossible dimensions. I choose to buy and he is there to serve me." And anything that conflicts with his ideas and tends to belittle his importance meets with decided disapproval.

There are two kinds of clerks whom I cordially dislike—the Time Server, who waits upon me with an I-wouldn't-if-I didn't have to air, and the Little Tin God, who condescends to fill my need with a manner that implies that he is rather above that sort of thing. My order is not of much consequence to either of them, and the chances are before I get what I need something of more importance to them diverts their

attention and I am left to await their good pleasure. It takes longer than is necessary to get what I want, and my self-esteem suffers at their hands. Ten to one their stock is in bad shape, and if the article I want is at all special or out of the ordinary I can get no information from them about it.

I would not have in my store a man whom I could not interest in his work—who would count the minutes or consider anything that would further my interests as too much trouble, and whom it would be necessary to prod up to get the service I should require. The indifferent man and the one too big for his place should have no part in my business, and with the multitude of ambitious young men eager for advancement there is no reason why they should. All the help and encouragement possible should be given my clerks and everything done that I could do to make their interests identical with mine, and if I failed to secure their very best work their place should be filled without delay.

The Country Hotel and Commercial Travelers.

BY WM. H. MAHER, TOLEDO, OHIO.

THE CHARACTERISTICS of the country hotel are so legion who shall attempt to describe them? If any one, it should be the traveling salesman, by whose patronage they find existence possible, and to whom they offer, in their card, "all the comforts of a home."

In the larger towns the hotel is but a very weak imitation of city hostleries; in the rural district it is only a boarding house, born by accident and existing only in name.

There can be no comparisons drawn between the "taverns" along the old stage roads of the East and the little "hotels" that came into existence throughout the West, as traveling men became more numerous at the close of the war. The two bear no resemblance to each other except that they both took the strangers in.

It is among my most vivid recollections that first dinner I ate in the little Ohio town where I first tried my luck as a salesman. It was a cold, wet March day, and it was more than a quarter of a century ago. The bell had hardly ceased ringing when four or five workmen came in from an adjacent lime kiln, washed at the sink in the one rusty tin basin, wiped their hands and faces on the already badly soiled towel used the piece of comb to smooth down their hair and then marched in to dinner. The landlord looked at me sternly, as if surprised that I could waste my time, and announced again that dinner was ready.

I made no claim to having been delicately brought up, but I was unable to dip my fork into the dish of pork floating in gravy and help myself to a piece, as each of the others had done. There was also a dish of boiled potatoes, plenty of bread and greasy looking butter, coffee without milk, and something that looked like a pudding. I nibbled at a bit of bread, sipped at the coffee and refused the pudding. I did

not want to hurt the landlord's feelings, for he was at the table with us, eating his pork and potatoes with great relish, and joking with one "Hank" in a way that showed him to be a man of much humor as well as appetite.

My supper was a slight improvement, or else I was hungry, and I ate a little. At 11 o'clock my day's work came to an end and I was shown to a little room that was much nearer 5 x 7 than 7 x 9. But my order book was singing to me of the good trade I had. My first day was a grand success, and I found as much pleasure in that little room as I expect ever to find in the most spacious chamber the Palmer House can give me.

Then I recall a little inn down in the center of Indiana kept by an old Pennsylvania German and his wife; of driving to it one cold day and finding an open fire place in the sitting room and logs blazing on the hearth. I noticed that everything about the room was as clean and bright as a new pin. I remember the glorious water in the well at the back door, the neat table, the ham and eggs, the rich coffee with genuine cream, and as I recall them I would give a good deal to be as hungry now as I was then and have the same supper before me.

To every man who has been many years on the road pleasant visions come before him as he recalls the hotels he visited and the landlords he has known. These men meet one at the depot to offer assistance with baggage, and they greet him as if he were an old friend. And he is a friend. Upon his last visit, if the work there can be called a visit, he had an hour's talk with the landlord, and he was shown a little bit of the latter's history; that glimpse made him respect his host forever after.

The landlord is the salesman's guide book and often his mercantile reference. He gives the history of the trade since the last visit, tells about all changes, what men have been around and what they did in the way of sales, and gives many pointers to the present visitor.

Frequently the landlord owns a horse and is ready to drive you to some interior town. He identifies himself with your errand and when you reach the place will do all he can to help you sell a bill.

As you talk together you find that he is very human and but little different from yourself in his love for his family, his desire to better his condition and his willingness to do everything that comes in his way that will help him get on.

By and by you begin to resent the stale jokes made at his expense, you sympathize with him in the unreasonable demands made upon him by so many of your fellows, and you hear with contempt the criticisms made upon his table by men who never knew what a good meal was until they went on the road.

When you plan your trip you find yourself taking the landlord into consideration, and sometimes you have

him scout among the trade and report to you when will be your best time to stop there. He never disappointed you when you treated him as if he was a man. You saw how he got even (in his own quiet way) with the lordly airs and snubs some of his guests kept for his use and benefit.

And the truth will compel any fair minded man to testify that the country hotel table was generally clean and well supplied with such things as were within the reach of the local markets. The places one recalls where a pleasant meal was given him far outnumber the memory one has of scrimped meals or untidy tables.

The salesman who makes the smaller towns cannot always be regular at his meals, particularly if he makes business his master and treats himself as second to that. But let him come in from a long drive, tired, perhaps chilled, often having missed his dinner and now late for supper, and see with what alacrity the landlady prepares him a special meal. He is given hot ham and eggs, fried potatoes, a good cup of tea, nice bread and butter, and Delmonico could not coax him from there just then. The landlord comes in to wait on the table and hear a history of the day's work, and the mistress adds a plate of toast or a dish of sauce and stays to say a word or two to this man who treats her as respectfully as if she was the richest lady in the land.

Perhaps, and it is by no means infrequent, he is taken sick on the road and must spend a few days in bed. He is given the best and quietest room in the house, and there is no good thing that comes into the minds of these good people that is not at once done for him. They decline to receive one cent extra pay for their trouble and apologize that they could do so little.

If he simply needs care for an hour or two the whole house is turned over to his use, and they are as much hurt at any offer of extra payment for this trouble as you would be, my good reader, if your best friend should tender you payment for a kindly service done to him.

Taking into account the class of people who are his customers, no one will believe that his lot can be a happy one. When the mean man is refused an order he can always relieve his feelings by finding fault with everything about the hotel. This fellow is quite numerous. He endeavors by his pomposity on the road to make up for his insignificance in the city; and a landlord is much like a clerk in a store—he must listen to all the innuendoes and insults that are offered and not talk back. But he is allowed to think!

What a void there is when we come around on our regular trip and find the landlord gone. A new face meets us and mentions the American House. "Where's Newman?" "Didn't you know? He's dead." What, Newman dead? Why the town at once loses its familiar look and seems strange. Another man turns the register around

for you and assigns you to the same old room, but the house is a changed house.

The rooms seem cold and dismal without old John. Your customers buy as freely as ever, but the orders do not fill the place of the old landlord. This young fellow is very anxious to do everything for you that he can, but you can't help feeling sad over the loss of your old friend, and you determine to go to another hotel on your next trip.

There comes a day when you must leave the road. You make no farewell tour, say no "good-bys." It usually happens that your traveling, for some good reason, comes to a sudden ending, and another man must take your route.

You give him memoranda about hotels as well as about your customers. You send cordial messages to the old landlords and strongly worded invitations to call upon you when they come to town.

Some day, as you are busy discussing an important matter with an influential man, you look up and see a stranger standing at the office door. He has a rather deprecatory smile on his face, as if to soften you against his intrusion. You have it on your tongue to turn him over to a clerk, but you look again. A stranger? Not a bit of it! It's Agnew, the old Lagro landlord!

The clerks look up with surprise at the warmth of your welcome. You excuse yourself to the influential citizen; that matter must wait. Here's Agnew, who often gave you a warm welcome. The clerks are sure he is one of the largest customers on the books, and when they learn he is only the landlord of a little hotel in Indiana they nearly fall over with surprise.

But you! You see in his face a thousand reminiscences of your days on the road. Those days are behind you now and taking on the halo that always hovers over the past. He and they are so interwoven that you do not try to separate them. You are glad, very glad, that you can give the old fellow a pleasant hour. It does you good to meet him and you promise yourself that some of these days you will make a trip over the old road again just for the pleasure of meeting all the old friends you have there.

But you never will.

He must have been a traveling man of large experience who wrote, more than 100 years ago:

Who'er has traveled life's dull round,
Where'er his stages may have been,
Must sigh to think he still has found
The warmest welcome at an inn.

We who have been so lately travelers can say this of to-day and particularly so of the country hotel.

About 2000 of the new Krag-Jorgensen rifles are now ready, and it is probable that the equipment of the army with the improved weapon will begin at once.

Methods of Extending Business.

BY JAMES D. RICHARDS.

IT IS MY firm belief, founded upon facts coming under my observation, that judicious and persistent advertising pays. It has made some men and ruined others. Those of the readers of *The Iron Age* who have advertised in the past know best what amount they are justified in spending each year, but to those who have never given the matter serious consideration I would say: *Decide to spend a certain amount for advertising for the year.* A safe and conservative figure would be 5 per cent. of the total amount of the previous year's business. In all cities and towns where more than one newspaper is published it will be found that one or more papers have their largest circulation among the masses, while the others circulate among the aristocratic or moneyed class.

THE ADVERTISING FUND.

For convenience, in this article, I will call the first named papers the mechanics and the latter the bankers. Now divide the advertising fund in this manner: Sixty per cent. to the mechanics, 35 per cent. to the bankers and 5 per cent. to emergency advertising. By the latter I mean printing of circulars, programme and directory advertisements, and various other methods, good and bad, that present themselves in the course of the year.

I do not know, however, of anything under the head of advertising that pays as well, proportionately, as NEWSPAPER ADVERTISING.

If the advertising fund is limited, it is preferable to use the space in Sunday newspapers at seasonable times, but if the amount be large enough use the daily papers as well. Decide on regular days for each paper. If the papers used have Sunday editions have the advertisement in all of them. During the week use them alternately, except in cases where some seasonable specialty is being introduced, when it would be policy to use them all the same day.

An attractive and well written advertisement of 10 squares pays better than a whole column of jargon. In getting up advertisements, if possible use an outline cut or an electrotype of all or almost all of the articles mentioned. Give a correct and attractive description of them, and have the price prominently displayed.

OLD REGULAR PRICE.

The price should invariably be low. Some dealers advertise an article with a long, glowing description at the same old regular price and then wonder why the advertisement in that newspaper didn't pay. The public are smart, and generally speaking the shoppers are posted as to the price of staple goods: that's the reason why such advertisements don't pay.

Advertise Seasonable Articles at the Proper Time. Don't go too heavy on

high priced Base Burners in the mechanics, for hardly 30 per cent. of their readers are able to buy one at even a bargain price. Neither should much space be used in the bankers advertising a cheap dish pan, for the majority of their readers would not order out their carriage to come down town for the few cents saved; *vice versa* would naturally be the proper order. When advertising an article at a low price limit the time of sale. Use the

FIRM NAME

frequently in an advertisement, and select some particular and odd style of type, different from that used by others, for the firm name, and use it continuously; it catches the eye at first appearance and the public finally come to look for it. Have it electrotyped in different sizes and use it everywhere—on billheads, envelopes, &c.

CUTS AND PRICES.

Cuts of shadow pictures, Brownies, and of anything suggestive of the business or business maxims, should be used occasionally. They are attractive and tend to relieve the monotony of the everyday hum-drum style. Avoid long stretches of solid reading matter. Say what is said briefly and intelligently. Cuts and prices are more profitable than tiresome reading matter. Life is too short to the average American to wade through half a column of reading matter before coming to the point.

PRINTED MATTER.

The distribution of circulars is a practice liable to much abuse. I do not consider it good policy to have boys scatter them promiscuously; they too often find a resting place in some sewer, to facilitate quick distribution. Again, the public look on the contents of circulars handed to them or thrown in their yards with considerable distrust. Neither do I think the wholesale mailing of them is profitable, for usually a large percentage of them find their way to the dead letter office.

THE LATEST GUIDE.

My idea of the proper way to use circulars is to get up one of a special line, say a line of tools used by carpenters, masons, &c. In season mail them to these mechanics in your own and surrounding towns, using the very latest directory for addresses. Do the same with articles used by the farmer. The same applies to a line of House Furnishing Specialties, using the latest guides to get correct addresses and mailing them only to those persons who, by their occupation, would be most likely to appreciate and read them. Spring and fall is a good time to do this.

DON'T MISREPRESENT GOODS.

Never make extravagant promises in circulars that cannot be kept, and above all things do not misrepresent goods. If the right persons are employed to do it, they can write an attractive and glowing description of almost any article without misrepresentation.

MANUFACTURERS' CIRCULARS, ETC.

Where manufacturers furnish circulars, books, &c., of their goods, get a liberal supply, and have name and address printed on them. Put an assortment in every envelope sent out, with letters, bills, statements, &c. They are not entirely lost, even if they are mailed to the very manufacturer who furnished them, for he will appreciate the efforts of the dealer in behalf of his goods, and will perhaps let him in on the ground floor some time. Have a supply of the various kinds at the wrapping desk and have them go in every package.

Do not allow circulars to be wasted, as they represent some part of the business, and with the dealer's name on them are sure to do him no harm, no matter into whose hands they fall.

Some manufacturers furnish large posters of their productions; get as many of these as possible and have them put up in conspicuous places and on all roads leading to town.

HOLDING TRADE.

The knack of holding trade is the key-stone of the success of some of our most successful and wealthiest merchants. I believe, however, that a merchant can adopt such extreme measures and can be so terribly anxious to hold trade that the public will become suspicious of him to the extent of occasionally passing him by.

Treat customers respectfully and politely whether they buy or not, notwithstanding the fact that some of them try your patience and are as mean and miserable as it is possible to be. The latter kind may show no appreciation of your utmost kindness, but way down in their hearts they do appreciate it and often make the best customers, for the simple reason that they are always treated politely by you, when your competitor may not have the patience to endure them. An invariable rule should be one price to everybody. Deliveries should be made as promised. Accommodate customers even at some inconvenience and they will walk out of their way to patronize you.

REPAIRS.

Keep a record of the name and address of purchaser and the size or number of all articles that will probably need repairs in the future. Ofttimes the customer will be unable to find or forgets to look for the number of the article for which he wants repairs. The ability to furnish the desired information will be appreciated. Inform customers of this rule when they purchase and nine in ten times they will come to you for the repairs even at some inconvenience to themselves. They feel safe about it.

By the way, profits on repairs are not to be sneezed at, besides holding the customer for other goods.

WATCH REGULAR CUSTOMERS CLOSELY.

If they are charge customers you have their address, and if cash customers their address should be preserved. If you notice that any of them

are not dealing with you as regularly as before, a circular should be mailed to them, calling their attention to your numerous lines and thanking them for the past, and soliciting a share of their future trade. They will know by this that you appreciated their trade sufficiently to notice their absence from your store, and it will surely have a good effect.

SOUVENIRS.

I also think it a pretty and profitable custom to remember the regular trade once or twice a year with something in the way of a souvenir. For instance, a novel match box, card tray, neat calendar, cook book, or something of this kind. There are hundreds of inexpensive and appropriate things to be obtained. The receipt of these, unsolicited by customers, would be appreciated and gratifying.

We are a vain people, and our vanity is tickled to know that even our small purchases are noticed and appreciated by the busy merchant.

IMPOSITION.

Some may pride themselves on having a class of trade that pay them high prices, probably because of old acquaintance or long dealing, or because they dealt with their grandfathers who kept the stores before them; but rest assured that that same trade will sometimes discover that they have been imposed upon and will surely go elsewhere. Friendship or old acquaintance cuts a very small figure in modern business methods.

Remember also it is easier to make two new customers than to regain one dissatisfied one. The successful business house is one with a steady and established trade.

KEEP BEFORE THE PUBLIC

with seasonable bargains. Keep a clean store, and have the window or front displays particularly attractive. Put price signs on all window goods, and always have a few articles there

CHEAPER THAN OTHER STORES.

I don't mean by this to run a cut rate store, but I do consider it good policy to select some particular articles that are every day sellers and mark at a very close profit. For instance—

- Two-quart Cups, 4 cents.
- One-quart Buckets, 4 cents.
- Dover Egg Beaters, 10 cents.
- Hatchets, 18 cents.
- Two-foot Rules, 5 cents.
- Set Potts Irons, 75 cents.

There is but a small profit at these prices, but they are goods the public need continually, and it is well to educate them by window display and advertising that these are regular prices. They know they are cheap and will come for them.

The sale of anything can be summed up thus:

Get customer into the store.

Goods well shown are half sold.

Moderate prices on everything are catchy.

Intelligent sales people will do the rest.

Another good idea is to show the public by

ACTUAL DEMONSTRATION

what the goods will do. Select a clerk who is a good talker and thoroughly acquainted with the merits of the goods, and in season advertise that Mr. B. will give a free and public demonstration of the article selected. Invite all to come, taste, try and see before they buy.

There are manufacturers who send men out to demonstrate their goods; but it is usually the larger stores, who can afford to buy in large quantities, who are fortunate enough to secure them. The smaller dealers should and can have the demonstration as well. The public don't care whether the demonstration is made by Mr. K. of Philadelphia or Mr. B. of Oshkosh, providing, of course, the article is shown properly.

There are various articles suitable for these demonstrations, and they can be arranged to occur at convenient times throughout the year. Some of them will occur in an otherwise dull season. Always offer reduced prices on the goods while they are being demonstrated. The following are a few of such articles: Ice Cream Freezers, Gas and Gasoline Stoves, Cook Stoves, Meat Cutters, patent Cake Pans, patent Coffee Pots. There are also many articles in the Hardware line that can be used with equal success. Make cream, bake bread, biscuit, cake, and make coffee, while giving these various demonstrations, and give them away to all comers. The expense of doing this is not so great as you would imagine.

A series of demonstrations of this kind will surely stamp your store as the

LEADING AND WIDEAWAKE

store of the town, and I know from personal experience that they pay in point of goods sold, to say nothing of the great advertising secured.

GUESSING SCHEMES.

Interest and start the housewife to talking about your store and you will find it a standing and far-reaching advertisement. There are also various guessing schemes which have recently been used quite extensively.

It has always been a question in my mind, however, considering the expense attached to them when they are honest, whether they are ultimately profitable. They attract to a certain extent an unreliable and shifting class of trade who are always looking for something for nothing, and I believe in the end but a small percentage of the trade attracted this way ever become good paying or regular customers.

SAMPLE LINE OF ALL.

Always carry as large and complete a sample line as possible. Have the goods attractively displayed and marked. It is better to have a sample line of all sizes of an article and a moderate stock of each, than to have only a few sizes and an overstock of them. In the retail business it is variety and

not quantity that the customer appreciates. Keep posted as far as possible as to the prices of your competitor, and never ask more for the same goods. It may not be superfluous just here to call attention to the fact that the remarks in other parts of this article relative to advertising, circulars, printed matter, &c., would also be applicable to this subject of extending business.

NECESSARY ADJUNCTS.

The following are almost, if not entirely, the foundation of a successful business:

Keep thoroughly posted on prices on everything handled;

Read thoughtfully all the trade journals relative to the business; and

Watch closely the market reports so as to be able to take advantage of an opportunity when presented.

Price-Lists, Circulars, &c.

SWEATT MFG. COMPANY, Minneapolis, Minn.: Wheelbarrows, Factory Trucks, Hose Reels, Snow Shovels, Wagon Jacks, Saw Bucks, Mortar Hods, &c. Wheelbarrows are the company's specialty, and these are shown in a variety of styles suitable for various uses. The special features of these goods are the Sweatt patent barrel tray used on dump barrows, and the Hubbard Patent steel wheel.

AMERICAN CURLING IRON WORKS, 72 and 74 Market street, Chicago: Blotter illustrating the Columbian Folding Curling Iron, improved American Waving Iron, and the Nellie Bly Curler.

THE WESTERN FOUNDRY COMPANY, Chicago: Stable Fixtures, Roof Cresting and Lawn Furniture. This publication comprises 24 pages of illustrations of Stable Fittings in great variety, covering Mangers, Salt Disks, Sponge Racks, Hitching Rings, Special Oats Mangers, Mangers with flanges to prevent waste of food, Hay Racks, Cesspool Covers, Stall Gutters, Harness Brackets, Whip Racks, Hitching Posts, &c. The Lawn Furniture comprises a number of pleasing patterns of Chairs and Settees in cast iron work. The designs of Roof Crestings and Finials are numerous and highly ornamental.

A. C. WILLIAMS, Ravenna, Ohio: Hardware House Furnishing Specialties, Toys, &c. An illustrated catalogue and price list of 65 pages devoted to these goods states that the business was established at Chagrin Falls, Ohio, 50 years ago, and that on account of the rapid growth of the business it was removed to Ravenna, where unsurpassed shipping facilities were obtained.

THE AVERY STAMPING COMPANY, Cleveland, Ohio: Seamless Steel Hollow Ware and General Metal Workers. The Hardware and House Furnishing Department makes a line of goods, including the Avery Silver Steel Hollow Ware, Pure Nickel Sauce Pans, Steel Washers, Steel Garden Trowels, Steel Pipe Hook Plates, Pressed Steel Fence Posts and Hitching Posts, Ladles and Steel Mill Tote Boxes.

GRIFFITH, AXTELL & CADY COMPANY, Holyoke, Mass.: High Class Catalogues. A book of engravings calls attention to scope of work done by the company, which includes Designing Cards, Letter Heads, Catalogues, Covers and all kinds of commercial work. A specialty is made of

embossing, and the company state that they are prepared to furnish original and attractive advertising specialties.

THE NATIONAL CHEMICAL WORKS, Cragin, Ill.: Bonnell's Sodium Phosphate, combined with the proper ingredients to prevent boiler scale formation. A pamphlet devoted to the preparation describes its properties, the manner of using, and gives prices.

THE NUBIAN IRON ENAMEL COMPANY, Cragin, Ill.: Bonnell's Nubian Iron Enamels. A circular to the trade instructs the reader to touch a spark to a particular point on the paper and states that the fireworks resulting will produce interesting effects.

It Is Reported—

Colorado.

That the Dewey Hardware Company, DENVER, have been incorporated to do a wholesale and retail business. The capital stock is \$7000.

Illinois.

That James Ritchie of MORRISON has sold his Hardware business to Thomas Watt.

That Reed & Heine of ELGIN have purchased the store of W. K. Hoagland.

That Roy White has sold his Hardware store at GENESEO to Henry Bothe of AURILLA, IOWA.

That Harvey Crumbaker has bought the Hardware stock of A. T. Fassett, COOKESVILLE, and will resume business at the old stand, September 1.

That Nesemier & Geisemen is the style of a new Hardware and Implement firm at SHANNON.

That Hauger & Gerdes, Hardware merchants, COLETA, have been dissolved.

Indiana.

That C. Easton's Hardware store, at STINESVILLE, was recently burned out.

That the Hardware store of Kem & Wright, MARION, was entered by thieves on August 9 and a large quantity of Revolvers, Knives, &c., stolen.

Iowa.

That the Hardware stores of E. Owen and W. H. Burr, at ADAIR, were destroyed in a large fire at that place on August 7. Mr. Owen's loss was about \$6000; insurance, \$3000. Mr. Burr suffered a loss of \$4500, with insurance of \$1500.

That Mellor Bros., BOONE, have removed their stock to new quarters.

That A. J. Fairchild's Hardware store, at OTTUMWA, was broken into by burglars on August 2.

That Wellington Moore has disposed of his interest in the Hardware firm of Moore Bros., PERRY, to his brother, O. F. Moore, and the business will hereafter be conducted under his management.

Kansas.

That S. W. Foster, for years a citizen of CHANUTE, has decided to engage in the Hardware business at KANSAS CITY, having purchased a stock of goods there.

Massachusetts.

That E. Williams, PITTSFIELD, recently suffered a small loss by fire.

That E. D. Wells has withdrawn from the Hardware firm of Crosby & Wells, SPRINGFIELD, and will go into business for himself in the same line.

Minnesota.

That in a large fire at DAWSON on the 9th inst. A. Thompson's Hardware store was entirely destroyed.

Mississippi.

That the Oxford Hardware Company have been organized at OXFORD, with a capital stock of \$10,000, to commence business in September.

Missouri.

That the Hardware store of C. H. Boller, St. JOSEPH, was burglarized on the morning of the 8th inst. A large quantity of Pocket Knives, Scissors, Razors, &c., was taken.

That Bell Bros.' Hardware store at MISSOURI CITY was robbed on the 5th inst.

That K. Bartlett has closed out his Hardware and grocery business at BOGARD.

Nebraska.

That Williams & Benedict of EXETER have broken ground for a new Hardware store, 22 x 60 feet. Their former establishment was destroyed by fire a short time since.

New Mexico.

That the Rose Hardware Company, ALBUQUERQUE, have been incorporated by F. N. Rose and others. The capital stock is \$50,000.

New York.

That the safe in F. G. Foote's Hardware store at SKANEATELES was blown open by thieves on the 11th inst. and about \$100 in cash secured.

Ohio.

That Croll Bros., WALDO, have completed their new store building and taken possession.

That Winn & Clough have opened a new Hardware store at CONSTANTIA.

That G. & W. Hess are going out of the Hardware business at MONROEVILLE. George Van Horn of HAVANA will probably succeed them.

That Emery & Torrence of BELLE CENTER have purchased the Danforth Block for a Hardware store.

That A. Kuester's Hardware store, MONTPELIER, has been burned out with a loss of \$5000.

Oregon.

That J. L. Caviness & Co., dealers in Hardware, &c., LA GRANDE, have been succeeded by the La Grande Hardware Company.

Rhode Island.

That H. G. Haney & Co., PROVIDENCE, have been dissolved.

South Carolina.

That H. Boyd, Hardware merchant, LAURENS, has been burned out. Mr. Boyd was insured for \$20,000.

South Dakota.

That Chas. Forsyth of GROTON has disposed of his Hardware business.

That the Hardware store of G. F. Johnson, REDFIELD, was burglarized recently, the thieves securing about \$75 worth of Knives, Razors, Revolvers and Ammunition.

That R. M. Kinsman, WHITE LAKE, has sold his Hardware stock to W. Hebel.

Texas.

That R. W. Foat has opened up a new Hardware and Implement store at FORT WORTH.

Vermont.

That John A. Manson & Co. have opened a new Hardware store at BURLINGTON.

West Virginia.

That a large fire at St. CLAIRSVILLE destroyed the Hardware stores of R. J. Alexander and W. O. Umstead. The loss on the former was \$3000, with insurance of \$1000, and on the latter, \$2000, with insurance of \$1500.

Wisconsin.

That McKellips & Bissell, MORRISONVILLE, have moved into their new Hardware store.

That John Greenwald has sold his interest in the Hardware business at MONROE to A. Greenwald.

The Hardware trade throughout the country are requested to report business changes, improvements and other matters of trade interest suitable for mention in this department.

Paints and Colors.

It should be understood that the prices quoted in this column are strictly those current in the wholesale market, and that higher prices are paid for retail lots. The quality of goods frequently necessitates a considerable range of prices.

White Lead.—Competition with "trust" brands increases as the autumn season approaches. The manufacturers of new process Lead are actively at work and those who make mixed Leads are quite as energetic. Their prices are low and attractive to retailers and consumers who consider low price first, last and all the time. This has a somewhat unsettling influence upon the market for old Dutch process product. It would seem, however, that tariff uncertainties are quite as much of a disturbing influence, since foreign product, under the provisions of the Wilson bill, can compete successfully with the best American brands. The chance that crude material may be cheaper under the influence of the new tariff has a certain influence with close students of the situation and counts slightly as a factor in the market. Pending tariff uncertainties dealings are on a very moderate scale and official prices for the recognized standard American brands are nominal in a great degree.

Red Lead.—Buyers are going very slow at the present time. They are placing few orders for domestic product, and only with duty clause in contracts, and are no more liberal in their contracts for European product. This tends to check business, and the turnover of stock is comparatively light.

Litharge.—Buyers are very indifferent, and buy only as immediate wants necessitate. Urgent requirements are not above the average. If anything they run somewhat behind. Sellers make no special inducements, but there is enough competition to keep the market in more or less unsettled condition, and prices are rather weak.

Orange Mineral.—Little has been done in foreign brands and the market remains in a nervous condition with tariff uncertainties still a restraining influence. Prices have undergone no radical change.

Zincs.—Some improvement is noted in inquiries for American Oxide, but business does not improve a great deal and buyers' views are reduced somewhat, owing to limited jobbing demand for the product and cheapness of crude material. Foreign brands are offered freely at previous low prices.

Colors, &c.—No change is noticed in the market for any line of Dry or Oil Colors. Merely routine business, and that mostly at former prices. There is absence of new feature in Oil Colors and Mixed Paints.

Oils and Turpentine.

Linseed Oil.—Out-of-town crushers have taken orders recently for quite liberal quantities of raw Oil at from 52¢ down to 50¢, for delivery during the next 60 days. To that extent the market has a weaker appearance, but city crushers stand out firmly for 54¢, and manifest no anxiety. Their sales have been moderate, however, and knowledge of the fact that there is some cutting of prices tends to check business and the market is rather flat.

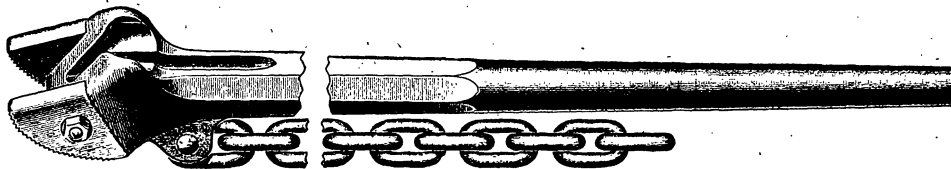
Cotton Seed Oils.—Very little change has taken place. If anything the market is a shade easier, but stock has not been offered with sufficient freedom to have any serious depressing effect and the changes in prices are slight. Most business here was on the basis of 32¢ @ 32½¢ for prime Summer Yellow, and 29¢ for prime crude, on the spot.

Lard Oil.—Prices have varied to a moderate extent only during the past week, business in a wholesale way having been mostly at 54¢ @ 55¢ for prime city made Oil, or on that basis. Buyers have purchased in a very indiffer-

Trimo Giant Pipe Wrench.

The accompanying cut represents a wrench put on the market by the Trimont Mfg. Company, Roxbury,

steel shank and jaws, and cut thread, of ample length and diameter to take any size of bit or of screw driver. The point is made that the crank arm revolves at right angles to the bit, as in the ordinary brace, and that the working of



Trimo Giant Pipe Wrench.

ent way, however, and the market is flat pending new developments in the product itself or in raw material.

Fish Oils.—Latest accounts indicate that the menhaden catch has been good recently and the yield of Oil sufficient to encourage the belief that the output for the season will be liberal. The combination do not deviate on price despite that and the fact that the demand is moderate. There is nothing new in crude Sperm or crude Whale Oils, and the refined products are almost stationary in price, with merely routine business passing.

Miscellaneous.—Common Olive Oil has met with slow sale and the market is rather weak. Spot stock may be secured at 53¢ @ 55¢, and on future shipments bids of as low as 50¢ have been solicited. Coconut Oils are rather firmer. Liberal purchases of Ceylon were made at 5½¢ @ 5¼¢ and sellers at less than 5½¢ @ 5¼¢ are now the exception.

Spirits Turpentine.—Speculative interest figures more or less prominently on the surface but has gained no new force the past few days. However, the leading operators keep a fairly light grip, holding prices at about 29½¢ for regular and 30¢ for machine barrels.

The Koch Shiftable Brackets.

Koch A. B. Company, Peoria, Ill., are offering new designs of their shiftable brackets for shelving. The brackets are made in four sizes: 6 x 8, 8 x 12, 8 x 16 and 9 x 21 inches, and the wall plates in which the brackets are supported are made in 2 foot lengths. The manufacturers state that while the brackets are intended primarily for store fittings they are equally valuable for putting up any kind of shelving, and can be employed to good advantage in pantries, kitchens and for other domestic use. The point is made that shelving thus put up is economically constructed, and that it has the advantage of being readily adjustable to suit varying needs, as well as being removable to facilitate cleaning.

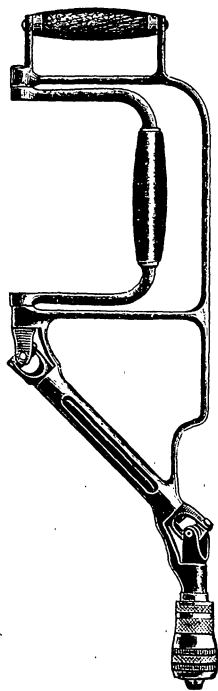
IN THE RECENT reference made in *The Iron Age* to the Sure Grip Tire Upsetter, manufactured by Butts & Ordway, Boston, the word "kinked" was misleading, and the word "upset" should have been used in its stead, in defining the work done by the machine. That the machine does not kink the tire is one of the strong points the manufacturers claim for it. We are advised that the demand for the machine, notwithstanding the dull times, is greater than ever before.

Krupp of Essen, it is said, will erect a large branch establishment at Wilhelmsburg on the Elbe.

Mass. The wrench is described as having a solid forged head, with detachable interchangeable gripping jaws made from a fine quality of tool steel, and the chain used as being the best quality of cable chain. It is explained that the head is made so that the chain is held securely, without danger of falling out; and that it still can be readily released at the will of the operator. The tool is designed for all kinds of work as well as hard and rough usage, and with its use the makers claim that there is no slipping, no locking and no lost motion. The wrench is made in six sizes, to take pipe from ¼ inch to 16 inches, with handles from 27 inches to 84 inches in length.

The Universal Bar Handle Brace.

The National Mfg. Company, Wilkes-Barre, Pa., are putting on the market the Universal brace, with a bar handle, as shown herewith. The frame of the brace is described as being light, rigid and strong, made of the best malleable iron, and the crank arm as of steel,



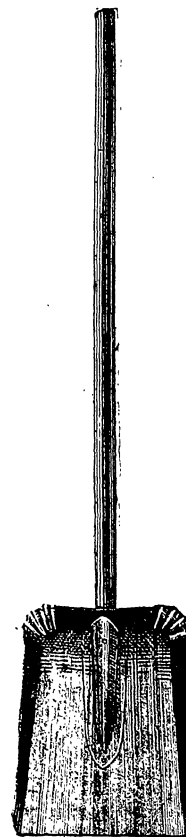
The Universal Bar Handle Brace.

resting in solid upper and lower journals in the frame. The universal joints are designed to convey the rotary motion of the crank arm to the bit, and to carry no other strains. It is stated that the chuck is of modern pattern, with

the brace is, therefore, familiar, natural and convenient. The brace is made with bar handle in 7 and 8 inch sweep, and with knob handle in 6 and 7 inch sweep.

Peninsular Furnace Shovel.

The accompanying cut represents furnace shovel offered by the Peninsular Metal Works, Detroit, Mich. The

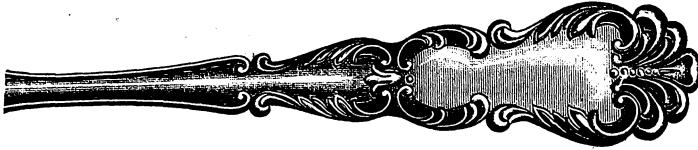


Peninsular Furnace Shovel.

shovel is described as being made of the best quality steel, with double edge, and as having four thicknesses of material at the lower corners. The makers remark that the shovel is designed to supply the demand among furnace men for a long handled, light, stiff and shapely shovel for use around furnaces, and that this shovel is of proper shape both for handling coal and for taking up ashes, while it can be used for any purpose for which any other shovel is commonly used. The manufacturers claim that the price is from 25 to 50 per cent. less than for anything of a similar nature, and that in shape the shovel is different from anything on the market. The shovels are made in four sizes, from 7½ x 15 inches to 10½ x 15 inches.

Regent Pattern Silver Plated Ware.

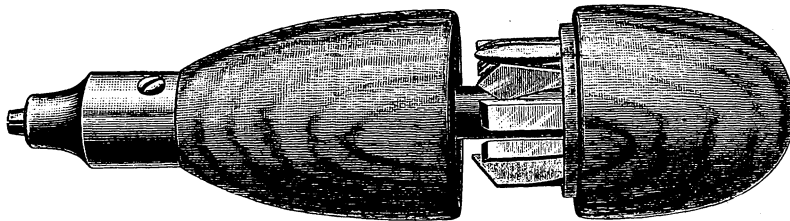
The accompanying cut represents a pattern of silver plated ware known as the Regent, introduced by C. Rogers & Brothers, Meriden, Conn. Spoons and

*Regent Pattern Silver Plated Ware.*

forks are made in this pattern of the various qualities of plating.

Tool Holder No. 6.

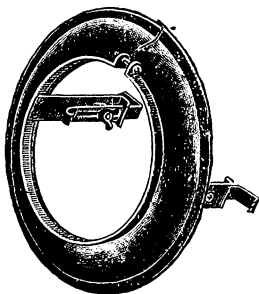
Millers Falls Company, 93 Reade street, New York, are introducing a tool holder, as here shown. It is made of cocobola wood, with the metal or chuck end nickel plated. The handle is arranged with a separate cell for each tool, of which there are 12, of the same quality, it is explained, as those put up with their Nos. 1, 4 and 5 handles. Among the obvious advantages of the holder is the ease with which a desired

*Tool Holder No. 6.*

tool may be selected, the quick detection of the absence of a mislaid tool from its cell and the ease with which tools may be changed in the chuck.

The Safety Stove Pipe Collar and Holder.

J. K. Randles, Quincy, Ill., for whom L. D. Sanborn, Grand Rapids, Mich., is sole agent for Michigan, is offering the stove pipe collar and holder here shown. The collar is designed to grip

*The Safety Stove Pipe Collar and Holder.*

any kind of pipe, and its adjustable claw hooks, which catch inside the flue at the outer ends, also enter inside the pipe at its inner end, giving a long reach in the flue hole. The claw hooks being adjustable are readily adapted to the different thicknesses of walls,

and are held in place by thumb nuts. After the collar is firmly fastened in place the pipe is inserted through the collar and into the flue hole, when, with a screw driver, the screw in the collar is tightened, clamping it around the pipe. It is claimed that neither

the pipe nor collar can possibly get loose or come out, until they are taken out, thus saving the carpets and wall paper from damage by soot and smoke, and obviating the necessity of wiring the pipe; and that no tools except a screw driver are required when putting it in place. The point is made that it does not mar or disfigure the wall and only upon close inspection can it be distinguished from an ordinary collar.

The Wernicke System of Hardware Shelving and Drawers.

The Wernicke Company of Minneapolis, Minn., are having excellent suc-

cess in introducing their system of shelving and drawers among the hardware trade. They have devised a system of portable shelving and drawers which has special advantages. The shelving is made in tiers, of such length as may be desired, and these tiers are set one on the other as high as a room will permit. The peculiarity of the shelving is its system of interlocking. Each tier is made like an open crate, with two long boards forming the bottom and one the top, to which the cross pieces or partitions are fastened. The bottom boards have a space between them the exact width of the top board, which runs down the center of the crate. The crates are of the same size precisely, so that when one is set on top of another the two bottom boards fit exactly over the top board of the under crate, thus making a lock which keeps the crates in place. They can then be used as shelves, or drawers are fitted between the partitions. Deep crates are made for bottom tiers so as to secure a broad base. In these bottom tiers either doors are fitted or drawers are furnished, as desired. When the removal of the fixtures is necessary, the drawers are taken out and the crates are either lifted off or they will slide out at the sides. The drawers are interchangeable, so that they need not be marked to fit an exact place. An ornamental cornice is supplied to finish the top of the shelving properly. The company also manufacture bookcases on the same principle. They are furnished with separate glass doors for each compartment

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Current Hardware Prices.

AUGUST 22, 1894.

NOTE.—The quotations given below represent Current Hardware Prices, whether made by manufacturers or jobbers. They apply to such quantities of goods as are usually purchased by retail Hardware merchants. Very small orders and broken packages often command higher prices.

The character @ is used to indicate a range of price: thus discount 50 & 10% @ 50 & 10 & 5%, signifies that the goods in question are sold at prices ranging from 50 & 10% to 50 & 10 & 5%.

Adjusters, Blind—

Domestic..... $\frac{1}{2}$ doz \$3.00, 33 $\frac{1}{2}$ @ 33 $\frac{1}{2}$ & 10%
 Excelsior..... $\frac{1}{2}$ doz \$10.00.....50 $\frac{1}{2}$ @ 82 $\frac{1}{2}$
 North's..... $\frac{1}{2}$ doz net @ 10%
 Zimmerman's—See Fasteners Blind.

Ammunition—See Caps, Cartridges, Shells, &c.

Anvils—

American—

Engle Anvils, $\frac{1}{2}$ d 9 $\frac{1}{2}$15 $\frac{1}{2}$ @ 15 $\frac{1}{2}$
 Horse shoe brand, Wrought.....11 @ 11 $\frac{1}{2}$
 Moore & Barnes Mfg. Co.....38 $\frac{1}{2}$

Imported—

Armstrong Mouse Hole.....9 $\frac{1}{2}$ @ 10 $\frac{1}{2}$
 S. & H., machine finished.....10 $\frac{1}{2}$ @ 11 $\frac{1}{2}$
 Trenton.....9 $\frac{1}{2}$ @ 10 $\frac{1}{2}$
 Wilkinson's.....10 $\frac{1}{2}$ @ 11 $\frac{1}{2}$
 Peter Wright's.....10 $\frac{1}{2}$ @ 11 $\frac{1}{2}$

Anvil Vise and Drill—

Allen Anvil and Vise \$3.00.....40 @ 10 $\frac{1}{2}$
 Cheney Anvil and Vise.....25 $\frac{1}{2}$
 Millers Falls Co., \$18.00.....30 $\frac{1}{2}$
 Holt's.....40 @ 40 @ 10 $\frac{1}{2}$

Apple Parers—See Parers Apple, &c.

Augers and Bits—

Boring Machine Augers.....70 @ 70 @ 10 $\frac{1}{2}$
 Car Bits, 12 in. twist.....50 $\frac{1}{2}$
 Common Augers and Bits.....70 @ 70 @ 10 $\frac{1}{2}$
 Cincinnati Bell-Hangers' Bits.....30 @ 10 $\frac{1}{2}$
 Forster Pat. Auger Bits.....15 $\frac{1}{2}$
 Jennings' Pattern Car Bits.....40 $\frac{1}{2}$
 Jennings' Pattern Auger Bits.....60 $\frac{1}{2}$
 A. E. Jennings & Co., No. 10, extension.....40 $\frac{1}{2}$
 C. E. Jennings & Co., No. 30.....60 $\frac{1}{2}$
 C. E. Jennings & Co., Auger Bits, $\frac{1}{2}$ set
 32 $\frac{1}{2}$ quarters, No. 5, \$5; No. 30, \$3.50, 25 $\frac{1}{2}$
 Russell Jennings' Augers and Bits 25 @ 10 $\frac{1}{2}$
 Lewis' Patent Single twist.....45 $\frac{1}{2}$
 L'Hommedieu Car Bits.....15 @ 10 $\frac{1}{2}$
 Pugh's Black.....30 $\frac{1}{2}$
 Pugh's Jennings Pattern.....30 $\frac{1}{2}$
 Snell's Bits.....60 @ 5 @ 60 @ 10 $\frac{1}{2}$

Bit Stock Drills—

Cleveland.....50 @ 10 @ 5 $\frac{1}{2}$
 Cincinnati, for wood.....30 @ 10 $\frac{1}{2}$
 Cincinnati, for metal.....45 @ 10 $\frac{1}{2}$
 Morse Twist Drill Co.....40 @ 10 @ 5 $\frac{1}{2}$
 New Process Twist Drill Co.....50 @ 10 @ 5 $\frac{1}{2}$
 Standard.....50 @ 10 @ 5 $\frac{1}{2}$
 Syracuse, for metal.....50 @ 10 $\frac{1}{2}$
 Syracuse, for wood (wood list), 30 @ 30 @ 5 $\frac{1}{2}$

Expansive Bits—

Clark's small, \$18, large, \$26.....40 @ 40 @ 5 $\frac{1}{2}$
 Ives' No. 4, $\frac{1}{2}$ doz, \$60.....40 @ 40 @ 10 $\frac{1}{2}$
 Stearns, No. 1, \$26; No. 2, \$18.....40 @ 40 @ 5 $\frac{1}{2}$
 Stearns' No. 2, \$48.....20 $\frac{1}{2}$
 Swan's.....40 @ 40 @ 10 $\frac{1}{2}$

Gimlet Bits—

See.....25 @ 25 @ 10 $\frac{1}{2}$
 Common..... $\frac{1}{2}$ gross \$2.50 @ 30.00
 Diamond..... $\frac{1}{2}$ doz \$1.25.....40 @ 10 $\frac{1}{2}$
 Double Cut:
 Hartwell's..... $\frac{1}{2}$ gross, \$10.00, 40 @ 10 $\frac{1}{2}$
 Douglass'.....40 @ 10 @ 50 $\frac{1}{2}$
 Ives.....60 @ 10 @ 60 @ 10 $\frac{1}{2}$
 Shepardson's.....45 @ 10 @ 45 @ 10 $\frac{1}{2}$

Hollow Augers—

Bonney's Adjustable, $\frac{1}{2}$ doz \$4.50.....50 $\frac{1}{2}$
 Cincinnati Adjustable.....25 @ 10 $\frac{1}{2}$
 Cincinnati Standard.....25 @ 10 $\frac{1}{2}$
 Douglass'.....33 $\frac{1}{2}$ @ 33 $\frac{1}{2}$ @ 10 $\frac{1}{2}$
 French, Swift & Co. (Beecher).....33 $\frac{1}{2}$ @ 33 $\frac{1}{2}$ @ 10 $\frac{1}{2}$
 Ives'.....33 $\frac{1}{2}$ @ 33 $\frac{1}{2}$ @ 10 $\frac{1}{2}$
 Ives' Expansive, each \$4.50.....50 @ 5 $\frac{1}{2}$
 Stearns'.....20 @ 10 $\frac{1}{2}$
 Universal Expansive, each \$4.50.....20 $\frac{1}{2}$
 Wood's, $\frac{1}{2}$ doz, \$4.50.....25 @ 10 $\frac{1}{2}$

Ship Augers and Bits—

L'Hommedieu's.....15 @ 10 @ 15 @ 10 $\frac{1}{2}$
 Snell's.....25 @ 25 @ 10 $\frac{1}{2}$
 Snell's Ship Auger Pattern Car Bits.....15 @ 10 @ 15 @ 10 $\frac{1}{2}$
 Watrous'.....25 @ 25 @ 10 $\frac{1}{2}$

Awl Hfts—See Hfts, Awl.

Awls—

Brad, Handled..... $\frac{1}{2}$ gr. \$2.50 @ \$3.00
 Brad, Shoulders..... $\frac{1}{2}$ gr. \$1.50 @ \$1.40
 Peg, Pat..... $\frac{1}{2}$ gr. \$5 @ \$3 $\frac{1}{2}$
 Peg, Should..... $\frac{1}{2}$ gr. \$1.50 @ \$1.55
 Scratch, Handled..... $\frac{1}{2}$ gr. \$4.00 @ \$4.50
 Scratch, Socket..... $\frac{1}{2}$ doz. \$1.10 @ \$1.20

Awl and Tool Sets—See Sets, Awl and Tool.

Axes—

First quality, best brands.....\$6.00 @ \$8.50
 First quality, other brands.....5.50 @ 6.00
 Beveled add 60 $\frac{1}{2}$ $\frac{1}{2}$ doz.

Axle Grease—See Grease, Axle.

Axles—

No. 1 Common.....3 @ 3 $\frac{1}{2}$
 No. 2 Common.....4 @ 4 $\frac{1}{2}$
 No. 7 to 14.....70 $\frac{1}{2}$
 Nos. 15 to 28.....47 $\frac{1}{2}$
 Nos. 19 to 22.....70 $\frac{1}{2}$ 3% cash
 Concord Axles, loose collar.....4 @ 4 $\frac{1}{2}$
 Concord Axles, solid collar.....5 @ 5 $\frac{1}{2}$
 Tubular Axles.....50 $\frac{1}{2}$

Bag Holders—See Holders, Bag.

Balances—

Sash—

Caldwell, low list.....30 $\frac{1}{2}$
 Pullman.....60 $\frac{1}{2}$

Spring—

Spring Balances.....40 @ 10 @ 50 $\frac{1}{2}$
 No. 2000 20 30
 Chatillon, $\frac{1}{2}$ doz.....\$0.50 0.95 1.75 net
 Chatillon Straight Balances.....40 @ 40 @ 10 $\frac{1}{2}$
 Chatillon Circular Balances.....50 @ 10 $\frac{1}{2}$

Barb Wire—See Wre, Barb.

Bars—

Crow—

Cast Steel..... $\frac{1}{2}$ d 2 $\frac{1}{2}$ @ 3 $\frac{1}{2}$
 Iron, Steel Points..... $\frac{1}{2}$ d 2 $\frac{1}{2}$ @ 2 $\frac{1}{2}$

Basins, Wash—

Standard Fiberglass, No. 1, 10 $\frac{1}{2}$ in., \$1.30;
 12 in., \$2.00; 13 $\frac{1}{2}$ in., \$2.50; 15 in., \$3.00.

Beams Scale—

Scale Beams, List Jan. 12, '82.....50 @ 10 @ 50 @ 10 $\frac{1}{2}$ & 5 $\frac{1}{2}$

Chatillon's No. 1.....40 $\frac{1}{2}$
 Chatillon's No. 2.....50 @ 10 @ 50 @ 10 $\frac{1}{2}$ & 5 $\frac{1}{2}$
 Custers'.....33 $\frac{1}{2}$

Beaters—

Egg—

Bryant's..... $\frac{1}{2}$ gross \$14.00
 Double (H. & R. Mfg. Co.), $\frac{1}{2}$ gross, No. 0
 \$12.00; No. 1, \$15.00; No. 2.....\$30.00
 Dover (Standard Co.)..... $\frac{1}{2}$ doz \$1.00 @ \$1.20
 Duplex (Standard Co.)..... $\frac{1}{2}$ doz \$1.00
 Duplex Extra Heavy (Standard Co.)..... $\frac{1}{2}$ doz \$1.00
 Easy (H. & R. Mfg. Co.)..... $\frac{1}{2}$ doz \$3.50
 Improved Acme (H. & R. Mfg. Co.)..... $\frac{1}{2}$ doz \$12.00
 Silver & Co..... $\frac{1}{2}$ doz \$5.50
 Spiral..... $\frac{1}{2}$ gross \$4.25 @ \$4.50
 Triple (H. & R. Mfg. Co.)..... $\frac{1}{2}$ gross \$16.50

Culinary—

Keystone, P. D. & Co., Each, No. 1, \$1;
 No. 2, \$2.....20 $\frac{1}{2}$

Bells—

Cow—

Common Wrought.....60 @ 10 $\frac{1}{2}$
 Kentucky Durham.....70 @ 10 $\frac{1}{2}$
 Kentucky, Sargent's list.....70 @ 10 $\frac{1}{2}$
 Kentucky, "Star".....20 @ 10 $\frac{1}{2}$
 Texas Star.....50 @ 10 @ 50 @ 10 $\frac{1}{2}$ & 5 $\frac{1}{2}$
 Western, Sargent's list.....70 @ 10 $\frac{1}{2}$

Door—

Crank, Brooks'.....50 @ 10 @ 2 $\frac{1}{2}$
 Crank, Cone's.....10 $\frac{1}{2}$
 Crank, Connel's.....20 @ 10 $\frac{1}{2}$
 Gong, Abbe's.....40 @ 10 @ 5 $\frac{1}{2}$
 Gong, Barton's.....40 @ 10 @ 5 $\frac{1}{2}$
 Gong, Yankee.....45 @ 10 $\frac{1}{2}$
 Lever, R. & E. Mfg. Co.'s.....50 @ 10 @ 2 $\frac{1}{2}$
 Lever, Sargent's.....60 @ 10 $\frac{1}{2}$
 Lever, Taylor's Bronzed or Plated.....net
 Lever, Taylor's Japanned.....25 @ 10 $\frac{1}{2}$
 Pull, Brook's.....50 @ 10 @ 2 $\frac{1}{2}$

Electric—

Bigelow & Dowse.....20 @ 20 @ 10 $\frac{1}{2}$
 Wollensak's.....20 @ 20 @ 10 $\frac{1}{2}$

Hand—

Extra Heavy Brass.....70 @ 10 @ 70 @ 10 $\frac{1}{2}$ & 5 $\frac{1}{2}$
 Light Brass.....70 @ 10 @ 70 @ 10 $\frac{1}{2}$ & 5 $\frac{1}{2}$
 Silver China.....33 $\frac{1}{2}$ @ 10 $\frac{1}{2}$
 White.....25 @ 10 @ 25 @ 10 $\frac{1}{2}$
 Globe Cone's Patent.....25 @ 10 @ 25 @ 10 $\frac{1}{2}$

Miscellaneous—

Call.....45 @ 50 $\frac{1}{2}$
 Farm Bell..... $\frac{1}{2}$ doz \$3.00
 Steel Alloy Church and School Bells.....50 $\frac{1}{2}$

Bellows—

Blacksmiths'.....60 @ 10 @ 10 @ 70 $\frac{1}{2}$
 Hand Bellows.....40 @ 10 @ 50 $\frac{1}{2}$
 Molders'.....40 @ 10 @ 50 $\frac{1}{2}$

Beltng, Rubber—

Common Standard.....75 @ 10 @ 75 @ 10 $\frac{1}{2}$ & 5 $\frac{1}{2}$
 Extra.....80 @ 10 @ 80 @ 10 $\frac{1}{2}$ & 5 $\frac{1}{2}$
 Standard.....70 @ 10 @ 75 $\frac{1}{2}$
 N. Y. B. & P. Co., Carbon.....60 @ 10 @ 65 $\frac{1}{2}$
 N. Y. B. & P. Co., Double Diamond.....60 $\frac{1}{2}$
 N. Y. B. & P. Co., 1846 Para.....40 @ 10 $\frac{1}{2}$

Bench Stops—See Stops, Bench

Benders and Upsetters, Tire—

Detroit Perfected Tire Bender 15 @ 15 @ 10 $\frac{1}{2}$
 Green River Tire Benders and Upset.
 Stoddard's Lightning Tire Upsetters.....15 $\frac{1}{2}$

Bits—

Auger, Gimlet, Bit Stock Drills, &c.,
 see Augers and Bits.

Bit Holders—See Holders.

Blind Adjusters—See Adjusters, Blind.

Blind Fasteners—See Fasteners, Blind.

Blind Staples—See Staples, Blind.

Blocks—

Cleveland Block Co., Mal. Iron.....50 @ 10 @ 50 @ 10 $\frac{1}{2}$
 Moore's Novelty, Mal. Iron.....60 @ 50 @ 5 $\frac{1}{2}$
 Grip Steel Tackle Blocks.....25 @ 25 @ 10 $\frac{1}{2}$
 See also Machines Hoisting.

Boils—

Carriage, Machine, &c.—

Com. list June 10, '84.....80 @ 10 @ 80 @ 10 $\frac{1}{2}$ & 5 $\frac{1}{2}$
 Charter Oak, list Oct., 1884.....80 $\frac{1}{2}$
 Genuine Eagle, Norway, list Oct. '84.....80 $\frac{1}{2}$
 Eagle, Norway, list Oct. '84.....80 @ 10 @ 80 @ 10 $\frac{1}{2}$ & 5 $\frac{1}{2}$
 Phila. pattern, list Oct. 7, '84.....80 $\frac{1}{2}$
 R. B. & W., old list.....70 $\frac{1}{2}$
 Bolt Ends, list Jan. 1, 1890.....80 @ 10 @ 80 @ 10 $\frac{1}{2}$ & 5 $\frac{1}{2}$
 Machine, list Jan. 1, 1890.....30 @ 10 @ 80 @ 20 $\frac{1}{2}$

Door and Shutter—

Cast Iron Barrel Square, &c.....75 @ 10 @ 75 @ 10 $\frac{1}{2}$ & 5 $\frac{1}{2}$
 Cast Iron Chain (Sargent's list).....55 @ 10 @ 55 @ 10 $\frac{1}{2}$ & 5 $\frac{1}{2}$
 Cast Iron Shutter Bolts.....75 @ 10 @ 75 @ 10 $\frac{1}{2}$ & 5 $\frac{1}{2}$
 Ives' Patent Door Bolts.....60 @ 10 @ 60 @ 10 $\frac{1}{2}$ & 5 $\frac{1}{2}$
 Wrought Barrel.....75 @ 10 @ 80 $\frac{1}{2}$
 W. B. K. Flush Common.....60 @ 10 @ 60 @ 10 $\frac{1}{2}$ & 5 $\frac{1}{2}$
 W. B. Shutter, Brass Knob.....50 @ 10 @ 50 $\frac{1}{2}$
 W. B. Shutter, Sargent's list.....60 @ 70 $\frac{1}{2}$
 W. B. Shutter, all Iron, Stanley's.....65 @ 70 $\frac{1}{2}$
 Wrought Square.....75 @ 10 @ 80 $\frac{1}{2}$
 W. B. Sunk Flush, Sargent's list.....60 @ 10 $\frac{1}{2}$
 W. B. Sunk Flush, Stanley's list.....60 @ 60 @ 10 $\frac{1}{2}$

Stove and Plow—

Plow.....60 @ 10 @ 60 @ 10 $\frac{1}{2}$ & 5 $\frac{1}{2}$
 Stove.....65 @ 70 $\frac{1}{2}$
 R. B. & W., Plow.....55 $\frac{1}{2}$

Tire—

Common, list Feb. 28, '83.....70 @ 70 @ 10 $\frac{1}{2}$
 American Screw Company
 Norway, Phila., list Oct. 16, '84.....80 $\frac{1}{2}$
 Eagle, Phila., list Oct. 16, '84.....85 $\frac{1}{2}$
 Bay State, list Feb. 28, '83.....75 $\frac{1}{2}$
 Franklin Moore Co.
 Norway, Phila., list Oct. 16, '84.....80 $\frac{1}{2}$
 Eagle, Phila., list Oct. 16, '84.....85 $\frac{1}{2}$
 Eclipse, list Feb. 28, '83.....75 $\frac{1}{2}$
 Port Chester Bolt and Nut Company
 Empire list Feb. 28, '83.....75 $\frac{1}{2}$
 Keystone, Philadel., list Oct. '84.....80 $\frac{1}{2}$
 Norway, Phila., list Oct. '84.....80 $\frac{1}{2}$
 R. B. & W., Philadel., list Oct. 16, '84.....85 $\frac{1}{2}$

Borers, Tap—

Common and Ring.....20 @ 10 $\frac{1}{2}$
 Clark's.....33 $\frac{1}{2}$ @ 35 $\frac{1}{2}$
 Enterprise Mfg. Co.....25 $\frac{1}{2}$
 Ives' Tap Borers.....33 $\frac{1}{2}$ @ 35 $\frac{1}{2}$

Boring Machines—See Machines, Boring.

Bow Pins—See Pins, Bow.

Boxes, Letter—

Tatum's.....40

Boxes, Wagon—

Per d.....24 $\frac{1}{2}$

Boxes, Miter.

Spilker's Excelsior, 3 in. \$7.50, 4 in.
 \$8.50, 5 in. \$13.00, 6 in. \$15.00.....20 $\frac{1}{2}$

Braces—

NOTE.—Most Braces are sold at net prices.
 Barber's.....50 @ 10 $\frac{1}{2}$
 Bartholomew's.....50 @ 5 $\frac{1}{2}$
 Armstrong's.....50 @ 5 $\frac{1}{2}$
 Common Ball, American.....\$1.00 @ \$1.10
 Davis Patent.....50 @ 10 $\frac{1}{2}$
 Fray's Genuine Spofford's.....50 @ 10 @ 55 $\frac{1}{2}$
 Fray's Nos. 70 to 120, 81 to 123, 207 to 414
 Ives' New Haven Novelty.....50 @ 10 @ 55 $\frac{1}{2}$
 New Haven Ratchet.....60 @ 25 @ 60 @ 25 $\frac{1}{2}$
 Barber Ratchet.....60 @ 25 @ 60 @ 25 $\frac{1}{2}$
 Barber's.....60 @ 25 $\frac{1}{2}$
 Spofford.....60 @ 25 @ 60 @ 25 $\frac{1}{2}$
 F. S. & W. Co., Peck's Patent.....80 $\frac{1}{2}$
 Rose & Johnson.....50 $\frac{1}{2}$

Brackets—

Shelf, fancy.....70 @ 70 @ 10 $\frac{1}{2}$
 Sargent's list.....70 @ 70 @ 10 $\frac{1}{2}$
 Other makes at a wide range of prices.
 Shelf, plain.....65 @ 70 $\frac{1}{2}$
 Regular, list.....60 @ 10 @ 70 @ 10 $\frac{1}{2}$
 Sargent's list.....60 @ 10 @ 70 @ 10 $\frac{1}{2}$
 Bradley Shelf Brackets.....70 @ 10 $\frac{1}{2}$

Bright Wire Goods—See Wire.

Broilers—

Kent's Self-Inch.....9 10 9 $\frac{1}{2}$ 11
 Basting, $\frac{1}{2}$ Per doz.....\$4.50 5.50 6.50
 Morgan Odorless..... $\frac{1}{2}$ doz. \$12.50
 New Haven.....60 $\frac{1}{2}$
 Queen City.....33 $\frac{1}{2}$
 Wire Goods Co.....55 @ 10 $\frac{1}{2}$

Buckets, Well and Fire—

See Pails.

Bull Rings—See Rings, Bull.

Butcher's Cleavers—See Cleavers, Butcher's.

Butts—

Cast Brass, Fast.....33 $\frac{1}{2}$ @ 10 $\frac{1}{2}$
 Cast Brass, Loose Joint.....33 $\frac{1}{2}$ @ 10 $\frac{1}{2}$
 Cast Brass, Tiebout's.....50 $\frac{1}{2}$
 Wrought Brass.....80 @ 10 @ 80 @ 20 $\frac{1}{2}$

Cast Iron—

Fast Joint, Broad.....60 @ 10 @ 60 @ 10 $\frac{1}{2}$ & 5 $\frac{1}{2$

Plate.....45%
Romer's Right Latches.....15%
R. & E. Mfg. Co., list Mar. 30, 1889.....60%
Sargent & Co., list July, 1894.....60%
Warner's Burglar Proof.....60%
Elevator.....83%
Moore's.....
Padlocks.....
Wrought Iron Padlocks:
Brittan, Graham & Mathes, list Jan., 1894.....75%
Mallory, Wheeler Co., list Jan. 1, 1894.....75%
Norwich Lock Mfg. Co., list June 10, 1891.....60%
Russell & Erwin Mfg. Co., list June 10, 1891.....60%
Sargent & Co., list January 1, 1894.....75%
William Wilcox Mfg. Co., list January 1, 1894.....75%
Ames Sward Co. up to No. 108 incl......50%
Ames Sward Co. above No. 108.....50%
Barnes Mfg. Co......40%
Champion Padlocks.....40%
A. E. Deltz.....40%
Eagle.....40%
Eureka, Eagle Lock Co......40%
E. T. Fraim's Keystone Scandinavian.....90%
1010 line.....90%
120 line.....90%
109 line.....90%
510 line.....70%
225, 610 and 208 lines.....60%
All other numbers.....60%
Horseshoe.....60%
Hotchkiss.....60%
Knock's.....60%
Romer's Nos. 0 to 91.....60%
Romer's Scandinavian, &c., Nos. 100 to 505.....90%
Scandinavian.....90%
Slamaker, Barry & Co......90%
No. 1010 line.....90%
No. 41 line.....60%
No. 61 line.....60%
No. 21 line.....70%
No. 109 line.....90%
Star.....60%
Yale Lock Mfg. Co......net prices
Sash, &c......
Attwell Mfg. Co......25%
Champion Safety list January, 1893.....70%
Clark's No. 1, 110; No. 2, 3 & 4.....85%
Common Sense, Jap'd, Cop'd.....85%
Erzed.....gr \$4.00
Common Sense, Nickel Plated.....gr \$10.00
Corbin's Daisy, list Feb. 15, 1886.....70%
Davis Bronze, Barnes Mfg. Co......60%
Ferguson's.....85%
Fish (Liesch, &c.), No. 100.....gr \$5.00
No. 105, & gr. 110.....60%
Giant, list Jan. 1892.....70%
Hammond's Window Springs.....40%
Hugunin's New Sash Locks.....25%
Hugunin's Sash Balances.....25%
Ives' Patent.....60%
Kempshall's Gravity.....60%
Kempshall's Model.....60%
Monarch.....60%
Payson's Perfect.....60%
Reading.....60%
Security.....70%
Universal.....80%
Walker.....60%
Wolcott's.....60%
Lumber Tools.....
See Tools, Lumber.
Lustro.....
Four-ounce bottles.....\$ dos, \$1.75; \$ gross.....\$17.00
Machines.
Boring.....
Without
Augers, Upright, Angular.
Boss, Carpenters.....3.60
Boss, Ship Bldrs.....3.35
Douglas.....\$5.50 \$6.75.....50%
Jennings.....5.50 6.75.....60%
Millers Falls.....7.50.....25%
Phillips' Patent.....
with Auger.....7.00 7.50.....40%
Snell's, Rice's Pat.....6.50 6.75.....40%
Pluting.....
American, 5 in., \$3.00; 6 in., \$3.40; 7 in., \$4.50 each.....35%
Combined Fluter and Sd Iron.....30%
Crown, 4 1/2 in., \$5.50; 6 in., \$4.00; 8 in., \$6.50 each.....30%
Crown Hand Fluter, Nos. 1, \$15.00; 2, \$12.50; 3, \$10.00; 4, \$8.25.....30%
Crown Jewel, 6 in......\$3.50 each, 35%
Domestic Fluter.....each, \$1.50
Eagle, 5 1/2-inch Rolls.....25%
Eagle, 5 1/2-inch Rolls.....25%
Kn x, 4 1/2-inch Rolls.....\$3.25 each, 35%
Kn x, 6-inch Rolls.....\$3.80 each, 35%
Holisting.....
Moore's Anti-Friction Differential Pulley Block.....30%
Moore's Hand Holist, with Lock Brake.....30%
Moore's Rope Differential Pulley Block.....80%
Maria & Beckley (Teal Patent).....30%
See also Blocks.
Washing.....
Anthony Wayne.....\$ dos, No. 1, \$42; No. 2, \$36; No. 3, \$42.
Wayne American.....\$ dos \$36.00
Wellsell.....\$ dos \$36.00
Western Star.....\$ dos, No. 2, \$36 No. 3 \$39
Mallets.....
B. & L. Block Co., Hickory & L. V......80%
Vibre Head, Stearns.....20%
Hickory.....20%
Algunvitz.....20%
Mattocks.....Regular list.
60%
Measures.....
Standard Fibreware, No. 1, peck.....\$ dozen, \$3.50; 1/4-peck, \$3.00
Meat Cutters.....
Cutters, Meat

Menders.....
Harness.....\$ doz, \$1.75
Hudson's Hose Menders, in set.....\$ doz, \$3.00
Hudson's Hose Bands.....\$ gr., \$1.25
Milk Cans.....See Cans, Milk.
Mills.....
Coffee.....
Box and Side, list Jan. 1, 1888.....60%
Net prices are often made which are lower than above discount.
American, Enterprise Mfg. Co., list Jan. 17, 1893.....20%
National list, Jan. 1, 1894.....30%
Swift, Lane Bros......30%
Wadell's New Box Mills, Ideal.....60%
Brand, New List.....60%
Mining Knives.....
See Knives, Mining.
Molasses Cates.....
See Gates, Molasses.
Money Drawers.....
See Drawers, Money.
Mowers, Lawn.....
Highest 10 in. 12 in. 14 in.
grade, \$4.00 \$5.25 \$4.50 \$6.00 \$5.00 \$6.75
\$3.00 \$3.25 \$3.50 \$5.50
Cheap. 2 25 2.50 2.75
Muzzles.....\$ doz, \$3.00, 25%
Nails.....
Cut and Wire. See Trade Report.
Wire Nails, Papered.
Association list, May 1, 92.....85%
Hungarian, Finishing, Upholsterers', &c. See Tacks.
Horse.....
Nos. 6 7 8 9 10
A. C.....25% 23% 22% 21% 21%
American.....9% 9% 9% 9% 9%
Anchor.....23% 21% 20% 19% 18%
Ausable.....23% 22% 21% 20% 19%
Capewell.....19% 18% 17% 16% 15%
C. B. K.....23% 22% 21% 21%
Champion.....25% 23% 22% 21% 20%
Champlain.....23% 22% 21% 20% 19%
Clinton, Fin.....19% 17% 16% 15% 14%
Empire Bronzed.....11%
Essex.....23% 22% 21% 20% 19%
Lyra.....9% 9% 9% 9%
Maud S.....23% 22% 21% 21%
Northwest'n.....25% 23% 22% 21% 20%
Putnam.....23% 21% 20% 19% 18%
Standard.....23% 21% 20% 19% 18%
Vulcan.....23% 21% 20% 19% 18%
Western.....23% 21% 20% 19% 18%
Picture.....
Brass Head, Combination list.....60%
Brass Head, Sargent's list.....60%
Porcelain Head, Combination list.....60%
Porcelain Head, Sargent's list.....60%
Niles' Patent.....40%
Nail Pullers.....See Pullers, Nail.
Nail Sets.....See Sets, Nail.
Nippers.....See Pliers and Nippers
Nut Crackers.....
See Crackers, Nut.
Nuts.....List Dec. 18, 1889.
Square, Hex.
Cold Punched.....5.00 5.10 off list
Hot Pressed.....5.80 6.50 off list
In packages of 100 lb, add 1-10% \$
net; in packages less than 100 lb, add 1/4% \$, net.
Oakum.....
Best or Government.....\$ 6 1/4 @ 6 3/4
Navy.....\$ 4 1/4 @ 4 3/4
U. S. Navy.....\$ 6 1/4 @ 6 3/4
Oil Tanks.....See Tanks, Oil.
Oilers.....
Brass and Copper.....50%
Broughton's Brass.....70%
Broughton's Zinc.....60%
Malleable, Hammers' Improved, No. 1, \$3.60; No. 2, \$4.00; No. 3, \$4.40 \$ doz, 10%
Malleable, Hammers' Old Pattern, same \$ doz, 10%
Olmead's Brass and Copper.....50%
Olmead's Tin and Zinc.....60%
Prior's Pat. or "Paragon" Brass.....60%
Prior's Pat. or "Paragon" Zinc.....70%
Steel, Draper & Williams.....50%
Wilmot & Hobbs Mfg. Co., Steel Anti-Rust.....60%
Openers, Can.....
American.....gross \$1.75 \$ doz \$2.00
Champion.....\$ doz \$2.00.....50%
Domestic.....\$ doz \$2.00.....45%
Duplex.....\$ doz 25 15 20%
Eureka.....\$ doz \$2.50, 10%
Excelsior, No. 1 \$2.50; No. 2, \$1.50.....40%
French, No. 4.....\$ doz \$2.25, 55%
Iron Handle, No. 6.....\$ gr \$6.00, 45%
Lyman's.....\$ doz \$3.75, 20%
Messenger's Comet.....\$ doz \$3.00, 25%
Moore's.....70%
Sardine Scissors.....\$ doz \$2.75 \$3.00
Sprague, No. 1, 55¢; 2, 60¢; 3, 65¢; 4, 70¢
Star.....\$ doz \$2.75
Stetter's.....
Sensible, Japanned, per doz.....60%
Sensible, Nickel, per doz.....75%
Surprise, per doz.....25%
New Sprague, Metallic Handle, per doz.....50%
New Sprague, Wood Handle, per doz.....60%
Universal.....\$ doz \$2.00.....55%
Verd's Best.....\$ gr \$1.12 \$ doz \$12.00
No. 2, \$2.40; No. 3, \$3.60.....50%
Packing, Steam.....
Rubber.....
Standard, fair quality.....70%
Inferior quality.....75%
Extra.....60%
Jenkins' Standard.....\$ doz \$2.50
N. Y. B. & P. Co., Double Diamond.....60%
N. Y. B. & P. Co., Salamander.....45%
N. Y. B. & P. Co., Carbon.....70%
Miscellaneous.....
American.....\$ doz \$1.00 \$ doz \$1.10
Italian Packing.....\$ doz \$1.10
Jute.....\$ doz \$1.10
Russia Packing.....\$ doz \$1.10

Pails.....
Creamery.....
S. S. & Co. 18-qt., \$7.00; 20-qt., \$7.25 \$ doz.
Galvanized Pails.....
Light. Heavy.
10 Quart.....\$2.00 \$2.25 \$2.50 \$2.50
12 Quart.....2.25 2.50 2.50 2.75
14 Quart.....2.50 2.75 2.75 3.00
Galvanized Buckets.....
Fire. Well.
10 Quart.....\$2.50 \$2.75 \$2.25 \$2.50
12 Quart.....2.75 3.00 2.50 2.75
14 Quart.....3.00 3.25 2.50 2.75
Indurated Fiber Ware.....
Fire Pails, deep.....\$ doz \$4.80
Fire Pails, round bottom.....\$ doz \$5.40
Milk, 14 qt.....\$ doz \$5.40
Stable, 14 qt.....\$ doz \$5.40
Star Pails, 12 qt.....\$ doz \$4.20
Standard Fiber Ware.....
Buggy Pails.....Platn. Dec'd
Chamber Pails, 14 qt.....6.00 \$7.00
Fire Pails, 14 qt., \$ doz, 3.75 4.25
Fire Pails, No. 1, 12 qt., \$ doz, 3.75
Fire Pails, No. 2, 14 qt., \$ doz, 4.25
Horse Pails.....4.00
Sugar Pails.....8.50
Water Pails, 12 qt., \$ doz, 3.15 3.75
Pans.....
Dripping.....
Large sizes.....\$ doz \$5.50
Small sizes.....\$ doz \$5.50
Silver & Co. (Covered).....40%
Fry.....
Standard list:
No.....1 2 3 4 5
\$ doz, \$3.00 \$3.75 \$4.25 4.75 \$5.25
No.....\$ doz \$6.00 \$7.00 \$8.00 \$9.00
Polished, regular goods.....75%
Acme Fry Pans.....60%
Dust.....
Steel Edge, No. 1.....\$ doz \$1.75
Roasting and Baking.....
Columbian, S. S. & Co.: Nos. 10, \$2; 20, \$2.25; 30, \$2.50 each.....60%
Paper and Cloth.....
Sand and Emery.....
List April 19, 1886.....50%
Sibley's Emery and Crocus Cloth.....30%
Parers.....
Apple.....
Advance.....\$ doz \$4.25
Baldwin.....\$ doz 4.75
Bonanza.....each 5.00
Daisy.....each 3.50
Dandy.....each 7.50
Eclipse.....each 4.00
Eureka, 1888.....each 18.00
Family Bay State.....each 12.00
Favorite.....each 5.00
Gait Metal.....each 4.00
Ideal.....each 4.00
Improved Bay State.....\$ doz \$7.00 \$8.00
Little Star.....each 4.00
Monarch.....each 13.50
New Lightning.....each 5.50
Petrole.....each 4.00
Perfection.....each 4.00
Reading 72.....each 3.75
Reading 78.....each 3.75
Rocking Table.....each 5.50
Turn Table.....each 4.50
Victor.....each 13.50
White Mountain.....each 4.00
Potato.....
Antrim Combination.....\$ doz \$5.50
Saratoga.....\$ doz \$5.50
White Mountain.....\$ doz \$4.50
Pencils, Soapstone.....
See Crayons.
Pickers, Fruit.....
Prize Fruit Pickers.....50%
Picks.....
Railroad or Adze Eye, 5 to 6, \$12.00; 6 to 7, \$13.00.....60%
Picture Nails.....
See Nails, Picture.
Pinking Irons.....
See Irons, Pinking.
Pins.....
Bow.....
Humason, Beckley & Co.'s.....70%
Peck, Stow & W. Co.....60%
Sargent & Co.'s, \$17 and \$18.....60%
Escutcheon.....
Brass.....70%
Iron, list Nov. 11, 1885.....75%
Pipe, Wrought Iron.....
List April 13, 1889.
1 1/2 and under, Platn. 67%
1 1/2 and under Galv.....50%
1 1/2 and over Platn.....67%
1 1/2 and over Galv.....50%
Boiler Tubes, list Oct. 24, 1892.....65%
Casing, list Nov. 15, 1892.....62%
Cold Drawn Seamless Steel Tubing.....50%
Inserted Joints Casing, list Nov. 15, 1892.....47%
Steel Boiler Tubes.....27%
Planes and Plane Irons.....
Wood Planes.....
Molding.....50%
Bench, First quality.....55%
Bench, Second quality.....60%
Bailey's (Stanley R. & L. Co.).....50%
Iron Planes.....
Bailey's (Stanley R. & L. Co.).....50%
Birmingham Plane Co.....60%
Chapin's Iron Planes.....50%
Davis' Iron Planes.....50%
Gage Tool Co.'s Self-Setting.....85%
Miscellaneous Planes (Stanley R. & L. Co.).....25%
Sergeant's.....60%
Standard Tool Co.....60%
Steers' Iron Planes.....50%
Plane Irons.....
Auburn Thistle.....80%
Buck Bros.....30%
Butcher's.....\$5.00 \$5.25 to 50%
Ohio.....80%
Sandusky.....80%
Stanley R. & L. Co.....50%
L. & J. White.....25%
Plates.....
Folice.....\$ doz \$6.00

Pliers and Nippers.....
Button's Patent.....60%
Carew's Pat. Wire Cutters.....20%
Cronk's 5 in., \$15.00; 10 in.....\$20 60%
Cronk's Button Pattern.....60%
Cronk's Carrier Pliers.....60%
Eureka's Pliers and Nippers.....60%
Gas Pliers.....50%
Gas Pliers, Gustar's Nickel Plated.....60%
Hall's Nippers, No. 2, 5 in., \$13.50; No. 4, 7 in., \$21.00 \$ doz.....40%
Hall's Pliers.....65%
Humason & Beckley Mfg. Co. 60%
Lindsay's Giant, No. 55, 5 in., \$ doz, \$10.50.....35%
Morrell's Parallel.....\$ doz \$12.00 30%
P. S. & W. Cast Steel.....50%
P. S. & W. Timmers' Cutting Nippers, add 8%.....50%
Russell's Parallel, 5 in., \$ doz, \$7.50, 35%
Waterbury Nippers, 5 in., \$ doz, \$7.50, 35%
Plumbs and Levels.....
Regular list.....75%
Cook's.....40%
Davis Inclinometers.....10%
Davis Iron Levels.....30%
Dialstone.....70%
Pocket Levels.....70%
Stanley's Duplex.....20%
Stanley's Handy.....20%
Poachers, Egg.....
Buffalo Steam Egg Poachers, \$ doz, No. 1, \$6.00; No. 2, \$9.00.....85%
Silver & Co., 6-Ring, \$ doz, \$4.00; 3-Ring.....\$2.00
Pokes Animal.....
Bishop's American.....\$ doz \$3.00
Bishop's L. X. L.....\$ doz \$5.00
Bishop's Steel Monarch.....\$ doz \$5.00
Bishop's Ohio.....\$ doz \$5.00
Bishop's Pioneer.....\$ doz \$3.75
Bolding.....\$ doz \$5.00
Buckeye Single Stale.....\$ doz \$2.50
Columbian, Double Stale.....\$ doz \$5.00
Eagle, Double Stale.....\$ doz \$3.25
Eagle, Single Stale.....\$ doz \$3.25
Metallic Horse Pokes.....\$ doz \$5.00
Police Goods.....
Daley's Improved Handcuffs, 2 Hands, Polished, \$ doz, \$48.00; Nickelplated, \$57.00; 3 hands, Polished, \$ doz \$72.00; Nickelplated, \$84.00.....25%
J. P. Lovell's Police Goods.....25%
Newhall Ship Chandlery Co., Handcuffs, \$15.00 \$ doz.....25%
Towers.....25%
Polish.....
Metal.....
Gaston's Silver Compound.....85%
Prestoline.....30%
Prestoline Paste.....85%
Tantite Mills:
Paste, 1/4 lb tins.....\$ gr, \$14.40
Paste, 1 lb tins.....\$ gr, \$38.00
Liquid, 4 pt. can.....\$ gr, \$38.00
Powder, 1 lb.....\$ gr, \$38.00
Wynn's White Silk, 4 pt. cans \$ doz, \$1.57
Stove.....
Black Eagle Benzine Paste, 5 and 10 lb cans.....12%
Black Flag.....\$ gr \$7.70, 10%
Black Flag, 5 lb and 10 lb pails.....\$ gr \$8%
Black Jack Water Paste, 5 and 10 lb cans.....12%
Bonnell's Liquid Stove Polish, \$ gr \$9.00
Bonnell's Paste Stove Polish, \$ gr \$9.00
Boynton's Noon Day.....\$ gr, \$13.00
Crown Paste.....\$ gr \$12.00
Crown Paste in 5 lb and 10 lb pails.....\$ gr \$12.00
Diamond O. K. Enamel.....\$ gr \$19.00
Diamond Rock Nickel Cleaner.....\$ gr \$10.20
Joseph Dixon's.....\$ gr, \$8.00, 10%
Dixon's Plumbago.....\$ doz \$2.50
Erie.....\$ gr, \$2.50
Gold Medal.....\$ gr, \$8.00, 25%
Japanese.....\$ gr \$3.50
Jet Black.....\$ gr \$3.50
Lustro.....\$ gr \$4.75
Nickel Plate Paste.....\$ gr \$8.00
Parlor Pride Stove Enamel, \$ gr, Raven Liquid, 8 oz. bottles.....\$ gr \$5.00
Raven Liquid, 8 oz. bottles.....\$ gr \$5.00
Raven Paste in 5 lb. pails (cases of 6 pails), \$ doz \$10%
Raven Water Polish, large boxes.....\$ gr \$7.20
Rising Sun.....\$ gr, \$5.00 \$5.75
Ruby.....\$ gr, \$3.75
Sun Paste No. 10.....\$ gr, \$7.20
Sun Paste No. 5.....\$ gr, \$4.50
Wynn's Black Silk, 5 lb pail.....\$ gr, \$12.00
Wynn's Black Silk, 5 lb box, \$ gr, \$12.00
Wynn's Black Silk, 8 oz. liq., \$ gr, \$12.00
Yates' Liquid.....\$ gr \$10.40
Yates' Standard Paste Polish, 10 lb cans, \$ doz \$12%
Poppers Corn.....
Round or Square,
1 qt.....\$ doz \$1.00; \$ gr \$8.00
1 1/2 qt.....\$ doz \$1.00; \$ gr \$9.00
2 qt.....\$ doz \$1.50; \$ gr \$14.00
Post Hole and Tree Augers and Diggers.....
See Diggers, Post Hole, &c.
Potato Parers.....
See Parers, Potato.
Pots.....
Glue.....
Enamelled.....40%
Family, Howe's "Eureka".....40%
Family, L. F. O.'s "Hands".....50%
Timed.....40%
Powder.....
In Canisters.....
Duck, 1 lb each.....45%
Fine Sporting, 1 lb each.....75%
Rifle, 1/2 lb each.....15%
Rifle, 1 lb each.....25%
In Kegs.....
Duck, 64 lb kegs.....\$2.25
Duck, 124 lb kegs.....\$4.25
Duck, 25 lb kegs.....\$8.00
Rifle, 64 lb kegs.....\$1.10
Rifle, 124 lb kegs.....\$1.90
Rifle, 25 lb kegs.....\$3.25
Presses.....
Fruit and Jelly.....
Enterprise Mfg. Co.....35%
Shepard's Queen City.....40%
Silver & Co.....\$ doz \$8.75
Pruning Hooks and Saws.....See Saws

Slaw Cutters—See Cutters.
Sleds Hand—
 Tubular Steel..... 8 doz. \$24.00, 40 doz.
 Lots of 8 doz. 50¢

Silver Plated, Hollow-
4 mo. or 5 % cash in 30 days.
Meriden Britannia Co. } 40¢
Reed & Barton }
Rogers & Brother }
Simpson, Hall, Miller & Co. }
Hartford Silver Plate Co. } 40¢
William Rogers Mfg. Co. }

Washers-
Size hole..... 5-16 3/4 1/2 5/16 1/4
Washers..... 5/16 3/4 1/2 5/16 1/4
In lots less than 200, \$ 5, add 1/4, 5-
boxes 1¢ to list.

Whips
American Whip Co.: Length. 4 1/2 5 5 1/2 6 6 1/2 7 7 1/2 8 ft.
X. L. Whalebone Drivn..... \$18.00 20.00 22.00 24.00 27.00 30.00 33.00 36.00
Bureks, Two-thirds Whalebone..... 15.00 16.50 18.00 20.00
Bull Bone, Half-length Whale
bone..... 11.00 12.00 13.00 15.00
American Standard..... 8.00 8.50 9.50 10.50 12.00 13.50 15.00 16.50
True Grip, Raw Hide Center..... 6.00 6.00 6.50 7.00 7.50 9.00
New Name, Stocked Java, Black
and White Colors..... 6.00
Americus, 98 Pen Whip..... 6.00
Gents' Light Driving No. 111..... 6.00
Gents' Light Driving No. 108..... 5.00
Hand-made Stocked Java No. 103..... 3.75 4.00
A large variety of cheaper grades..... 50¢ to \$3.00
Team Whips..... \$2.00 to \$7.50
Hardware assortment 10/American. 75 Whips for \$50.00.

Wire and Wire Goods- Iron
Br. & Ann., Nos. 0 to 13..... 75¢ to 10¢
Cop'd, Nos. 0 to 13..... 75¢ to 10¢
Galv., Nos. 0 to 13..... 70¢ to 10¢
Tin'd, Tin'd list, Nos. 0
to 13..... 70¢ to 10¢

Washer Cutters-
See Cutters, Washers.
Water Coolers-
See Coolers, Water.
Wedges-
Iron..... \$ 2 1/2 @ 2 1/2
Steel..... \$ 5 @ 3 1/2
Weights Sash-
Ton lots at foundry, \$ 10.00 @ 16.00
Well Buckets Galvan-
ized-See Pails, Galvanized.
Wheels Well
8 in., \$2.00; 10 in., \$2.50; 12 in., \$2.75

Br. and Ann'd,
Nos. 16 to 18..... 80¢
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Galvanized Fence..... 75¢ to 10¢
Mallin's An'ad & Tin'd on Spools..... 60¢ to 75¢
Mallin's Brass and Cop. on Spools..... 50¢ to 60¢
Steel Music Wire, 12 to 30, imported..... 60¢ to 70¢
Stubs' Steel Wire..... \$3.00 to \$2.30
Tate's Spooled, Tin'd & Annealed..... 60¢ to 75¢
Tate's Spooled Cop. and Brass..... 50¢ to 60¢
Tinned Broom Wire, 18 to 24, \$ 1..... 40¢
Wire Clothes and Lanes..... 50¢ to 60¢
Wire Picture Cord, see Cord.

Bright Wire Goods-
Standard list..... 90¢ to 95¢

Wire Cloth and Netting-
Galvanized Wire Netting..... 80¢ to 100¢
Painted Screen Cloth \$ 100 ft. \$1.45 to \$1.60

Wire Barb-
See Trade Report.

Wire Rope-See Ropes, Wires.

Wrenches-
American Adjustable..... 40¢ to 100¢
Baxter's Adjustable "S"..... 40¢ to 100¢
Baxter's Diagonal..... 60¢ to 100¢
Coe's Genuine..... 50¢ to 100¢
Coe's "Mechanics"..... 50¢ to 100¢
Girard Standard..... 65¢ to 100¢
Lansom & Sessions' Engineers'..... 60¢ to 100¢
Lansom & Sessions' Standard..... 70¢ to 100¢
Lansom & Sessions' Agric'l..... 75¢ to 100¢
P. S. & W. Agricultural..... 80¢ to 100¢
W. B. Diamond..... 50¢ to 100¢
Acme, Bright..... 50¢ to 100¢

Acme, Nickel..... 40¢ to 45¢
Alken's Pocket (Bright)..... 25¢ to 30¢
Alligator..... 40¢ to 45¢
Always Ready..... 30¢ to 40¢
Bemis & Call's:
Adjustable S..... 35¢ to 40¢
Brigg's Pattern..... 30¢ to 35¢
Combination Black..... 40¢ to 45¢
Combination Bright..... 40¢ to 45¢
Cylinder or Gas Pipe..... 45¢ to 50¢
Extra Heavy..... 45¢ to 50¢
Merrick's Pattern..... 45¢ to 50¢
No. 3 Pipe Bright..... 55¢ to 60¢
Bit Wrench, Adj., Tatum's..... \$ 2.25 to \$2.50
Boardman's..... 30¢ to 35¢
Cincinnati Brace Wrenches..... 25¢ to 30¢
Diamond Steel..... 55¢ to 60¢
Donohue's Engineer..... 20¢ to 25¢
Eagle..... 50¢ to 55¢
Hercules..... 70¢ to 75¢
Tafts' Vise Wrench..... 65¢ to 70¢
The Favorite Pocket, \$ doz \$4..... 30¢ to 35¢
Walker's..... 55¢ to 60¢
Webster's Pat. Combination..... 25¢

Wringers, Clothes-
In lots of less than one dozen.
Am. Wringer Co.'s list, July 2, '94, 2% cash
Colby Wringer Co., list May 1, '94, 2% cash
Lovell Mfg. Co., list July 2, 1892, 2% cash
Peerless Mfg. Co., list Feb. 1892, 2% cash
National Wringer & Mfg. Co., list
June 1, 1892, 2% cash

Wrought Goods-
Staples, Hooks, &c., list, March 17, 1892
85¢ to 25¢ to 85¢ to 30¢

Paints, Oils and Colors.-Wholesale Prices.

Animal and Vegetable Oils-

Linseed, City, raw, per gal. 54 @ 55
Linseed, City, boiled..... 57 @ 58
Linseed, Western, Winter..... 55 @ 56
Lard, City, Extra Winter..... 53 @ 54
Lard, City, Prime..... 48 @ 49
Lard, City, Extra No. 1..... 45 @ 46
Lard, City, No. 1..... 43 @ 44
Lard, Western, prime..... 52 @ 53
Cotton-seed, Crude, prime..... 28 @ 29
Cotton-seed, grades..... 26 @ 27
Cotton-seed, Summer, Yel-
low, prime..... 30 @ 31
Cotton-seed, Summer, Yel-
low, off grades..... 30 @ 31
Sperm, Crude..... 60 @ 61
Sperm, Natural Spring..... 65 @ 66
Sperm, Bleached Spring..... 65 @ 66
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